DOCUMENT RESUME

ED 309 585 EC 220 576

AUTHOR Baine, David
TITLE Handicapped Children in Developing Countries: Assessment, Curriculum and Instruction.
INSTITUTION Alberta Univ., Edmonton. Dept. of Educational Psychology.
REPORT NO ISBN-0-88864-934-7
PUB DATE 88
NOTE 192p.
AVAILABLE FROM Department of Educational Psychology, Education N6-102, University of Alberta, Edmonton, Alberta, Canada ($13.00).
PUB TYPE Information Analyses (070) -- Guides - Classroom Use - Guides (For Teachers) (052) -- Books (010)

EDRS PRICE MF01/PC08 Plus Postage.
DESCRIPTORS Classroom Techniques; *Curriculum Design; *Curriculum Development; *Developing Nations; *Disabilities; Educational History; Elementary Secondary Education; Hearing Impairments; Large Group Instruction; Relevance (Education); *Student Evaluation; *Teaching Methods; Testing; Visual Impairments

ABSTRACT

A discussion of teaching and testing methods for children with disabilities focuses on techniques appropriate for use in developing countries. The book has several purposes. Its aims are to: (1) discuss practical, step-by-step methods that can be used readily in existing classrooms; (2) describe ideal methods and materials as long-term goals to work toward as classroom conditions improve; (3) describe methods for developing ecologically valid testing and teaching materials to fit unique, contemporary cultural, social, economic, geographic, urban, and rural environments; (4) explain methods for developing curricula designed to teach skills likely to be required under future conditions resulting from technological, industrial, social, and cultural changes and rural-to-urban migration; (5) describe the theories, philosophy, and supporting evidence for teaching and testing methods; and (6) provide examples of actual situations in both urban and rural areas of developing countries. Chapters address: characteristics of curricula used in developing nations; problems arising from adoption of western curricula; the use of ecological inventories to develop curricula; teaching methods; methods for teaching disabled children in large, regular classrooms; teaching students with limited hearing or vision; testing problems and recommendations; and functional testing. (MSE)

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HANDICAPPED CHILDREN IN DEVELOPING COUNTRIES:

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ASSESSMENT, CURRICULUM AND INSTRUCTION

EC 220 576

Handicapped Children in Developing Countries:

Assessment, curriculum and instruction

David Baine

Canadian Cataloguing in Publication Data

Baine, David.
Handicapped children in developing countries

Bibliography: p.
ISBN 0-88864-934-7

1. Handicapped children—Education—
Developing countries. I. Title.
LC4019.B34 1988 371.9'091724 C88-091635-4

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Typesetting:
Publication Services
Faculty of Education
University of Alberta

Cover Design:
Instructional Technology Centre
University of Alberta

Printed by:
University of Alberta Printing Services

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Department of Educational Psychology
Faculty of Education
University of Alberta
Edmonton, Alberta, Canada

To Karen and the Kami,
essential spirits; thank you.

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Acknowledgments

Financial assistance for various aspects of preparation, printing and distribution of this textbook was received from the University of Alberta, Faculty of Education, Support for the Advancement of Scholarship Fund, from the Bishop Bekkers Foundation and from the Johannes Foundation, both in the Netherlands. Because of the small potential profit margin, most publishers are not interested in printing a book of this nature. Thus, the assistance provided by the University, the Bishop Bekkers Foundation and the Johannes Foundation was indispensable and most gratefully received.

David Baine

Foreword

Throughout the Developing World there is an absence of a suitable textbook describing methods of testing and teaching students with handicaps. Textbooks adopted from the West are often quite inappropriate. Detailed discussions are made of issues that are of relatively minor importance in Developing Countries. Alternatively, issues of major importance in Developing Countries are frequently not even mentioned. Where common issues are described, the conditions in Western Countries may be considerably different from those in Developing Countries. Often, tests and remedial methods recommended for use in Western Countries are quite unsuitable for use in Developing Countries. The tests, normed on Western children, are usually culturally biased. Frequently, too, the materials, specialized personnel and physical facilities recommended for use in Western countries are not available in Developing Countries. In contrast with classrooms in Western schools, over 50% of the primary schools in India do not have a concrete structure, drinking water or a playground; 40% of the schools are without blackboards; 70% do not have libraries and 85% do not even have lavatories (Kumar, 1984). Kumar did not mention the absence of hearing aids, wheelchairs, braillewriters, clinics, resource rooms, psychologists, reading specialists, as well as speech and occupational therapists. Nor did Kumar report on the number students without textbooks or workbooks. In many Developing Countries, there may be more than seventy handicapped and normal functioning children in the same classroom. Numbers of critical differences between schools and students in Western Countries and those in Developing Countries make textbooks written for one context unsuitable for the other.

This textbook has several purposes. First, practical, step-by-step methods of testing and teaching are discussed that may be readily used in existing classrooms in Developing Countries. Many of these techniques are equally suitable for use with normal functioning and handicapped students: mentally retarded, learning disabled, visually and aurally impaired and physically handicapped. Second, ideal methods and materials are described as long-term goals to work toward as classroom conditions in Developing Countries improve. Third, methods are described for developing ecologically valid testing and teaching methods and materials to fit the unique *contemporary* cultural, social, economic, geographic, urban and rural environments of Developing Countries. Fourth, methods are explained for developing curricula designed to teach skills that will likely be required under *future* conditions resulting from technological, industrial, social and culture changes and migration from rural to urban areas. Fifth, the textbook not only explains step-by-step testing and teaching methods, but also describes the underlying theories, philosophy

and/or supporting evidence so that readers will have a greater understanding of why things are done in particular ways. Numerous references are cited, many from Developing Countries. Sixth, many examples are provided of actual situations in urban and rural areas of Developing Countries.

The author describes various practical examples from his experiences in Burma, Malaysia, India and the Caribbean. In addition, many illustrations were obtained from an extensive survey of assessment, curricular and teaching methods and materials used throughout the Developing World. A comprehensive library survey was also conducted.

Chapter One discusses the characteristics of regular and special education curricula currently used in various Developing Countries. The discussion reviews the influence on curriculum development of colonial educational systems and indigenous beliefs and values. The limitations of contemporary curricula are reviewed as a rationale for recommending specific improvements. Unique difficulties associated with rural and vocational programs are described. Because most curricula focus on rote, formal, academic learning, students learn few, if any, of the practical skills required in their daily lives. The advantages of life skills, basic and nonformal education programs are described. A number of specific recommendations for improving curricula are made.

Chapter Two reviews a variety of problems associated with the adoption of Western curricula. Curricula designed for Western children teach many skills required only in Western Countries and often fail to teach skills that are essential in Developing Countries. The chapter also reviews problems associated with a) teaching nonfunctional readiness, and preacademic skills; b) teaching skills in isolation from the natural environment; and c) using norm referenced curricula with handicapped children.

Chapter Three introduces the ecological inventory as a method of building curricula to teach functional skills required in students' current and future economic, social, cultural and geographic environments. Step-by-step methods for using ecological inventories to design curricula for handicapped students are clearly illustrated.

Chapter Four is the first of two chapters discussing practical methods of teaching. In the previous chapter, ecological inventories were used to identify functional tasks to include in a curriculum. In the present chapter, these tasks are clearly stated in the form of instructional objectives. Methods for analyzing these instructional objectives to identify the skills required to perform the tasks are illustrated. The remainder of the chapter introduces a number of specialized methods for teaching these skills. Examples of prompting, fading, chaining and rewarding performance are provided.

Chapter Five explains the "Attention, model, prompt teaching strategy" used in individual and group instruction. This strategy incorporates many of the teaching techniques discussed in the previous chapter. Several examples of "scripted teaching sequences" are provided. These scripts describe exactly what a teacher is to say and do while teaching par-

ticular skills. Step-by-step methods for writing scripted teaching sequences are explained.

Chapter Six describes a number of practical methods for teaching handicapped students in large, crowded, regular classrooms. Among the numerous methods reviewed are: use of student and volunteer or paid teaching aides, the "buddy system," learning centres, itinerant consultants and creative scheduling. Detailed methods for training student and classroom aides are discussed. An example of a scripted teaching sequences for use by teaching aides is provided.

Chapter Seven describes practical methods for teaching students with limited hearing. General recommendations are made for communicating effectively, assigning seat work and making referrals. Techniques for diagnostically adjusting and repairing hearing aids are also described. Step-by-step methods for performing a Speech Hearing Test are presented. This is a test of a student's ability to hear common speech sounds under ideal conditions. A diagnostic test of a student's ability to understand his/her teacher in typical teaching conditions is also described in detail. This test helps teachers find the best methods of communicating with (teaching) students having limited hearing. Selected references for this specialized area of teaching are provided.

Chapter Eight describes methods for effectively teaching students with limited vision. General recommendations are made for communicating effectively, assigning seat work, giving demonstrations, working at the chalk/slate board and making referrals. Several step-by-step tests for finding the best methods for using the chalk/slate board, giving visual demonstrations and presenting printed information to each student with a visual impairment are explained in detail. Selected references for this specialized area of teaching are provided.

Chapter Nine describes the nature of tests commonly used with handicapped persons in Developing Countries. Difficulties associated with adapting or translating culturally biased tests normed on Western children are discussed. Issues related to the use of norm referenced and developmental tests, clinical and in situ testing methods, and adapting standardized tests for handicapped persons are reviewed. An extensive list of recommendations describes various methods for improving testing in Developing Countries.

Chapter Ten begins with a discussion of the nature of functional testing. The topic is discussed in relation to instructional validity, intelligence testing, as well as achievement and diagnostic testing. The nature and development of functional, criterion referenced tests are described as an ideal. Examples of ideal criterion referenced tests are presented. Practical methods for approximating the ideal are also discussed. Curriculum-based assessment is described as an option. Informal checklists are discussed as a useful starting point in the design of both criterion referenced tests and curriculum-based assessment. The biweekly assessment and planning guide is reviewed as a practical option for all teachers. Finally, because circumstance will likely lead to the adoption of tests developed in

other countries and other parts of the same country, a number of considerations are discussed that should be made in the adoption of tests.

The book is written for regular and special education teachers in-training. The book will also be a valuable resource for teachers following training and for foreign consultants and teacher trainers working in Developing Countries. The text is written in simple language. Where technical terms or abstract concepts are used, definitions and/or examples are provided in context.

Chapter One

Characteristics of Curricula Used in Developing Countries

The goals of this chapter are to:

a. define the nature of a curriculum;
b. provide a brief review of factors influencing the nature of curricula in Developing Countries;
c. identify some of the limitations of curricula currently in use in various Developing Countries, and
d. present a number of recommendations for improving curricula used in rural and urban areas of Developing Countries.

A *curriculum* is defined as the content and sequence of the knowledge and skills to be taught in an area of instruction. For example, in the area of beginning arithmetic, the curriculum may include the following skills taught in the order indicated: rote counting 1-100; rational counting 1-100; reading 1-100; copying 1-100; writing from dictation 1-100; converting numbers to tallies; converting tallies to numbers; adding two single-digit numbers (with and without tallies); adding two two-digit numbers without carrying; adding two two-digit numbers with carrying, etc.

In many Developing Countries, "special education curricula" are merely "watered-down" versions of regular education curricula. In special education, some of the more difficult tasks have often been replaced by simpler craft activities and/or more practical life-skills. Otherwise, students with handicaps are merely expected to follow regular curricula at a slower rate than that of regular students.

The framework of the regular education system and the economic, social and political conditions and ideologies determine to a great extent the existence, form and content of special education (Csapo, 1987). Because regular and special education curricula share many similar characteristics, both types of curricula will be reviewed in the following discussion. In addition, various aspects of non-formal, basic needs and life-skills curricula will be reviewed.

Historic Influences and Present Circumstances

Origins of regular and special education curricula

Most of the curricula in Developing Countries have originated from British or European sources and more recently from North America. According to Duminy (1973) the subject matter of instruction of early regular education schools for Africans was almost entirely based on West-

European cultural content and systems of thought. For example, when Zambia obtained its independence in 1964, it inherited a colonial system of education and an alien curriculum preparing people to live better in Europe than in their own African communities (Csapo, 1987).

Csapo (1987) reported that most of the special education programs that developed later in the sub-Sahara regions of Africa were based on the Western model. African primary school children for many years memorized the names of the counties of England or the provinces of France with a total disregard of what might have been of interest or importance in their own environments (Duminy, 1973).

India's present educational system was largely conditioned by the constraints and compromises of the past. Basically, the educational system reflected the educational needs of the colonial power. The colonial power required Indians to be educated in a manner useful to the colonial administration (Rao, 1983). The old British methods of education continue today in India. Now, instead of being prepared for a foreign administration, students are trained to join the Indian Civil Service. Unfortunately, however, the saturation point in civil service employment has been reached and many of the educated young are unemployed (Mohanti, 1973).

In India, the educational system operated on the principles developed in the United Kingdom. Successful achievement in the examinations provided the only means of moving to successive stages of education. The examinations and standards, relevant in the colonizing country, dominated the curriculum and pattern of teaching in Indian schools. Subsequently, what came to be valued was success in examinations rather than the content of the material studied. The content was largely Western (Rao, 1983).

Similarly, colonial powers imposed their educational systems on most of the Southeast Asian countries. In time, Western thinking, as reflected in the educational systems began to be considered "anachronistic, dysfunctional and grossly ill-fitted to the oriental mind" (Socrates, 1983).

In Africa, too, the wisdom of blindly copying and adapting Western solutions was being questioned (Ogbue, 1975; Sarr, 1981). Questions were being raised about the Western type of education of both regular and special education (Csapo, 1987).

A number of common problems have been identified in many of the curricula currently being used in various Developing Countries. Some of these limitations are discussed in the paragraphs that follow.

Emphasis on memorization

According to Duminy (1973), indigenous African education required considerable memorization to assist the oral transmission of laws and customs from one generation to the next. European education of the 19th and 20th centuries also required considerable rote repetition. The merging of these two educational systems led to an even greater emphasis upon rote learning (Duminy, 1973). Initially, African teachers had to teach

with little or no teacher training. Because the teachers themselves frequently had little understanding of the imported European curricula, they had to rely on methods of rote learning and teaching. The main concern was that students should *know* their work and memorize it, without regard for understanding. Teachers introduced to the curriculum at a later time also relied on the rote approach to teaching and learning as that was the way they had been taught (Mbilinyi, 1977).

In a study reported by Mbilinyi (1977), one of the most common methods of teaching involved a teacher copying notes from a book onto the blackboard. These notes were then copied by the students. In another common approach, teachers read from a book. Students were required to write the material word-for-word, memorize it and recite it the next day. In many cases, the students had little if any understanding of the meaning of the material (Mbilinyi, 1977). Rao (1983) reported that the same situation existed in India where greater importance was given to memorization than to comprehension.

According to Neufeldt (1987), the overwhelming approach to schooling in Asia, Africa, the Middle East, the Caribbean and in other Developing Countries is towards rote learning rather than problem solving. Buchanan (1975) described educational systems in many Developing Countries as formal, literate or bookish, authoritarian and characterized by rote learning and didactic teaching.

Separation of school and community

The curricula imported from England, Europe and America were designed for those environments and had little relationship to the day-to-day environments into which they had been adopted (Duminy, 1973). The subject matter of instruction in the first schools for Africans was almost entirely based on West-European cultural content and systems of thought. The daily life experience of students was totally ignored in the school. Education was concerned mostly with remote and unfamiliar topics. There was an almost complete separation of the Bantu child's life and his school education (Duminy, 1973). The curriculum placed greatest emphasis on reading, writing and arithmetic. The curriculum tended to be literary and non-practical. The main focus emphasis was on book-learning and emphasized the distance between life and education. To many African teachers, education was something contained only within the pages of books. It was something contrived within the walls of a classroom, something strange and foreign (Duminy, 1973).

Despite strong urging from curriculum designers to integrate the school and the community, and strong protests from headmasters and teachers that integration is underway ("There is an old man who comes in sometimes to show them how to make musical instruments." "The village football team uses our field."), the school and the community remained apart (Hawes, 1979). The average teacher valued the security, status and formality of the classroom and the books. In the view of parents and teachers, timetables, facts, figures, books and tests belonged in a category

of ideas and things that were separate from the village. These were the things that both teachers and parents accepted as school business. Thus, the formal school remained separate from the community it served because the people in that community wished it to be separate. Strong urgings in curriculum guides to integrate the school and the community did not change this situation (Hawes, 1979).

Where this separation of the school and the students' own social and cultural environment existed, students were unable to translate what had been learned into their world of experiences (Duminy, 1973). For example, in Tanzania, (Mbilinyi, 1977) children at seven years of age assumed many domestic responsibilities. Girls cooked, fetched water, prepared a wood fire, pounded meal and attended younger children. Boys tended goats and cattle, scared birds from the crops, helped repair fences and houses, and ran errands. School life was in sharp contrast to home and community life. In school, children were put in dependency positions similar to those of infants. Children who fed and bathed their infant sibling at home, in school, had to ask permission to go to the toilet. The majority of teachers relied on rote teaching methods. Such learning experiences were in sharp contrast to the situations at home. For example, young boys, in a moment's notice, had to discover what had happened to a lost calf. Young girls, in their mother's absence, had to decide what to cook for supper (Mbilinyi, 1977). Often the differences between the school and the community were greatest among students in rural areas where the majority of the population lived.

In India, educational institutions were generally oblivious to the problems and characteristics of their environments, especially those of disabled persons. This situation resulted in isolation of teachers and students from the realities of life and the world of work. Lack of social relevance had serious consequences for students emerging from educational institutions. These students were unable to acquire insight and skills relevant either to sociocultural processes or to the world of employment and work. This situation was particularly true of the curriculum designed for the disabled (The Common Trust, 1985).

Curricula in rural communities

A report on learning needs in rural areas (IIEP, 1977), stated that education in rural areas of Developing Countries was often considered to be irrelevant to the needs of rural people (e.g., Coombs & Ahmed, 1974; Malassis, 1976). Existing school programs and curricula did not take into account local environmental conditions. These educational systems were foreign and alienating to rural students. The programs were primarily urban in their orientation (IIEP, 1977). Rural children often discovered that their curricula, materials and examinations were designed by and for people from more prosperous environments (Hawes, 1979). In Malaysia, for example, in the 1970s, the curriculum was content-loaded and oriented to serving the needs of an academic, literate, urban elite. Its main purpose seemed to be the filtering of students into a highly academic tertiary

educational system (Mukherjee & Singh, 1983). In India, some of the subjects taught bore little relationship to village environments (Rao, 1983). Thus, the years of primary education, which for the majority of rural children were often the end of their formal education, frequently failed to serve even the most basic function of schooling. Rural children did not learn suitable literacy skills and a broad-based general education useful to their lives in rural areas (Rao, 1983). In the rural context of India, from the villagers' point of view, the traditional school educated their children, while government schools were viewed merely as a channel for socio-economic mobility (Rao, 1983).

In a study of tribal education in India, Kundu (1984) found that existing textbooks depicted urban, upper middle class families whose customs, traditions, dress and food appeared quite alien to tribal students. School examinations were also based on the middle class culture. For example, students were asked to write essays mostly on urban-oriented themes, such as, "A circus show you have visited," and "The bazaar you live in."

Handicapped students in Africa in residential placements away from home had the misfortune of learning a lifestyle that was totally different from that of their parents. As a result, following training, they were largely unfit for life in their rural homes. Often these students had not been taught the skills required for traditional, rural employment. For example, students in one program for the blind were being taught craft skills directed toward the tourist and foreign markets. None of the skills they learned were relevant to the rural environments in which tourist and foreign markets were nonexistent.

Referring to Transkei, Hawkins (1980) wrote that, in a country where most people were rural dwellers, where the majority of people relied on agriculture for their livelihood, the basic principles of conservation and agriculture should form the basis of the school curriculum. In South Africa, the highly academically-oriented, liberal arts curriculum was poor preparation for life on the land, or for the many early school leavers (Csapo, 1987).

Vocational training

Chege (1984) reported that in East Africa, the training offered to persons with mental handicaps in some vocational centres was not relevant to the needs of the community. This training resulted in the production of graduates who could not benefit from available resources in their communities. Chege recommended that no vocational program should be planned without a careful assessment of current and projected future community needs. For example, training a resident of an arid area to farm will not be profitable if the student is unable to farm when he returns home. Also, mass training of carpenters without careful assessment of their ability to gain employment may be a waste of time, effort and money. Graduates of some of these programs have been observed selling their tool kits and turning to begging (Chege, 1984).

In a Government operated project, in another country, students graduating with carpentry, farming and telephone operating skills had been successfully employed. However, students taught weaving failed to gain employment because the marketability of their products had not been investigated before the training had been established (Moriyama, 1982). Moriyama suggested that if handicapped persons were taught a local craft that competed with persons without handicaps, the handicapped people must be given compensatory advantages such as subsidized materials. Also, highly organized, marketing facilities should be established for their products. Otherwise, they would fail to be self-supporting.

Influencing attitudes and values

As was previously mentioned, schools and communities were sometimes kept apart because parents and teachers viewed the school as separate from the community (Hawes, 1979). What were the prevailing attitudes that shaped the nature of these educational programs? In India, Rao (1983) suggested that, because progress beyond the fourth standard was determined by the awarding of a certificate, because the certificate was a symbol of literacy, and because the certificate helped graduates gain employment in the urban sector, parents were less concerned with the content of the curriculum than they were with getting the certificate. Rao also reported that the occupational hopes of parents for their children were largely determined with the prestige ranking of the occupation. Rao claimed that most villagers, rich and poor alike, regarded formal education merely as a means of gaining socioeconomic mobility.

Successful completion of examinations, regardless of the skills learned a) led to certification and a higher level of status; b) permitted admission to higher levels of education, c) opened opportunities for better jobs, d) permitted movement from rural to urban areas, and e) led to higher salaries that could be used to support parents. As a result, parents, in general, appeared to be content to accept educational programs regardless of their content and their emphasis on memorization. Thus, teachers, headmasters and curriculum builders may have had little motivation to improve the educational system. Nevertheless, a strong demand did emerge in Africa, Asia and Latin America for some form of basic education for the masses. This basic education was viewed as a first phase in a process of lifelong education (Hawes, 1979). According to Hawes, basic education was designed to insure that students received at least the minimum skills necessary for survival.

Life skills, basic and non-formal education

Several different types of more functional education have recently been developed. According to Botti, Carelli and Saliba (1978) basic education programs were designed in accord with the ecological, socioeconomic and cultural characteristics of the geographic area concerned. Thus, in rural areas, curriculum developers took account of the style of life and the tech-

niques used by people engaged in agriculture, animal husbandry, and fishing, etc. The programs were adjusted to the needs of the students. Student needs varied according to the students' age, and sex, as well as the demands of their environment and work. Basic education was designed to prepare the entire population for daily life. As a formal service, basic education meant compulsory schooling covering the primary, and sometimes the secondary levels, of schooling. As a nonformal service, basic education comprised the educational activities designed for those parts of the population schools did not or could not reach. Basic education programs usually included the following aspects.

a. Learning of elementary language skills used in reading, writing, speaking and understanding.

b. Learning of basic mathematical concepts used in working and daily life.

   If the basic teaching (reading, writing, arithmetic) is related to real situations, it will serve as a vehicle for more functional knowledge and skills directly linked to the objectives of development programs (agricultural production, health, nutrition, etc.).

c. Acquisition of knowledge and functional skills useful in family life (household budget, health, child care, nutrition, sewing, manual work, etc.).

d. Initiation into the natural sciences to the extent necessary to comprehend natural phenomena occurring in the geographical region.

e. Acquisition of practical skills facilitating work for payment (agriculture, fishing, animal husbandry, crafts, etc.).

f. Initiation into civic life to foster participation in social, economic and political activities of the community (Botti, Carelli & Saliba, 1978).

UNESCO/UNICEF (1978) described a "basic needs" approach to the education of under-privileged children. This approach included instruction in subjects such as: selection and maintenance of a safe water supply; methods of waste disposal; growing, storing and consumption of more and better quality foods, and nutritional education. While the primary school had been the principal agent of instruction, increasingly, out-of-school programs were being considered both as alternative and supplementary to the school programs. Also, while the school teacher had been considered to be the primary mediator of learning, additional mediators of learning were being used to assist the deprived, underprivileged young. In this approach, education was based on a combination of learning activities that could occur in schools, at home, in the market, or elsewhere. This functional approach provided a greater number of

opportunities for reaching disadvantaged children through a larger number of mediators of learning (UNESCO-UNICEF, 1978).

A similar approach had been undertaken in the Kwamsisi Pilot Project in Korogwe, Tanzania. The program was developed as a model of school-community integration. Children worked on a village farm in cooperation with villagers. The general curricula were followed except for geography, history and science which were geared towards the local area. For example, an effort was made to teach traditional medicine and traditional history. Villagers and locally-based government officials, such as the rural medical aide and the agricultural officers, participated on a regular basis teaching locally-oriented subjects. The village developed many nonfarm economic activities. One of these was a workshop for woodwork and tinsmithery for Standard VII leavers. Children no longer memorized the kings and queens of Great Britain as they used to (Mbilinyi, 1977).

Saunders and Vulliamy (1983) reviewed the Education for Self-Reliance Program in Tanzania and the Secondary Schools Extension Project in Papua New Guinea. In Tanzania, all schools had, to some extent, initiated practical projects, usually agricultural. Some schools paid for their entire food bill through income derived from selling produce. In most schools, a period of time during the afternoon was allocated to work on the projects. These projects usually involved maize farms of up to fifty acres or more, banana plantations, vegetable gardens, beans, citrus fruit, millet, coffee, tea, egg production, piggeries and small dairy farms. Non-agricultural projects were much less common, apart from the cooperative shop most schools ran. These projects were usually concerned with selling cakes, embroidery, hair plaiting and other items of craftwork made by students. The Tanzanian model retained separation between the practical and the academic curricula (Saunders & Vulliamy, 1983).

In contrast, in the Papua New Guinea program, the practical and academic programs were merged. All of the schools made some progress integrating the skills to be learned in the practical projects with skills being taught in English, math, social science, and science. A planning group of teachers identified skills to be learned in their subject areas that might overlap with skills being taught in the practical projects. Following this analysis, skills from the two programs were integrated. In one of the schools, the educational practical project was selected after consultation with people in the students' local communities. This resulted in the students doing a compulsory agriculture project and a choice of one of three livestock projects (cattle, pigs or poultry) and one of three plantation-agriculture projects (coconuts, cocoa or coffee) (Saunders & Vulliamy, 1983).

Non-formal education has been described as the organized provision of learning opportunities outside the formal education system, covering a person's lifetime and programmed to meet a specific need: remedial, vocational, health and welfare, civic and political or self-fulfillment. Non-formal education was designed to help an individual solve the problems confronted within his/her own environments. Non-formal education took

into account local conditions, culture and language. The first step in preparation of a non-formal curriculum was to identify the problems faced by a particular group of people. A survey (interview/questionnaire) was conducted of village officials and household representatives (Naidu, 1981).

Gandhi (1940, cited in Naidu, 1981) said, "Give the villagers village-arithmetic, village-geography, village-history and the literacy knowledge that they must use daily." For the guidance of adult workers, Gandhi reportedly suggested a curriculum of handicrafts, sanitation, health, literacy, village organization, social reconstruction and village culture.

Prior to the beginning of the non-formal primary education project for artisan fisherfolk in Orissa, India, a number of studies were carried out regarding traditional fishing methods, craft and gear. Information from these and other studies provided the basic knowledge about the target group and was extensively used to develop the curriculum and learning materials. Several learning packages were developed. One package, "The sea is our life," referred to the environment and fishing. Writing, reading, arithmetic, science and social studies were integrated into the package. Various modules of this package were concerned with the seashore, fishing as an occupation, and traditional fishing technology relating to boats and nets. Package two, "Community and family," also included reading, writing and arithmetic. Various modules in this package reviewed festivals, beliefs, superstitions and practices, the role and duties of the family and its various members, and several aspects of community life. Another package was concerned with aquatic ecology, ecosystems of open beaches, river deltas, tidal areas, currents, winds, life cycles of fish and modern fishing technologies (Tietze, 1985).

The non-formal education program developed in Bhumiadhar, India for high school drop-outs between the ages of 9 and 14 linked educational activities with community development. Some of the training activities included tilling the land and planting seeds at several sites; cultivating mushrooms for commercial purposes; preparing compost pits; developing commercial arts and crafts, including ceramics, tie-dye and paper maché; and using sewing machines.

In the non-formal education centre, education was related to life. Some fundamentals of arithmetic, languages, science and social science were taught to the children, but the major part of the curriculum was devoted to the work experience program. For example, when children were required to learn about vegetables, they went to the garden to till the ground, manure it, sow the vegetable seeds and nurture the plants. Children learned how to cook the vegetables and also learned about the nutritional value of foods. The parents and the teachers helped the students in this work (UNESCO-UNICEF, 1978).

A non-formal education program in Andhra Pradesh, designed for children 6-14 years of age, taught the following skills.

a. Agriculture: for example, how to increase the yield; removing weeds; eradicating pests; protecting the paddy; producing castors; selecting good seeds; preparing the soil.
b. Eradication of malaria: testing the blood; how malaria spreads; curing malaria, and eradicating mosquitoes.
c. Using molds in clay work; making bricks, tiles, pipes and toys.
d. Cultivating the habit of saving; calculating interest; knowing about various savings schemes.
e. Erasing superstitions about diseases. Is leprosy the result of a sin (Mellbring, Osterling & Persson, 1983)?

In 1981, a community-based pilot project was begun in Indonesia to provide basic education and rehabilitation services to people with visual handicaps living in rural areas where no services were available. The program used village volunteers to provide basic services to blind people in their community. A 72-hour training course, combined with a six month practicum, provided the field workers with basic knowledge in the areas of orientation and mobility, activities of daily living, work skills and basic skills of braille and arithmetic. The field workers trained both the blind person and his family. Each field worker maintained a caseload of five clients and spent a minimum of six hours per week in program activities. An evaluation of the program revealed that there was no question that the blind people had become more self-reliant. One-half of the blind people had begun to contribute to family and community economic activities by making mats, baskets and other handicrafts (Department of Research and Development, Minister of Education, Indonesia & Helen Keller International, 1983).

Change is often difficult to make

Writing functional skills into the curriculum has frequently not been enough to make a change in the content and methods of teaching. In one country, for example, although the primary school curriculum included practical subjects such as nature study, gardening, needlework and metal work (subjects not examined or used for selection for entry into secondary school), total emphasis was placed on the academic subjects of English, mathematics, French and geography. The practical subjects were totally neglected because the sole object of students who sat for the Certificate of Primary Education, and indeed the only concern of parents, was the ranking the student achieved. People were becoming aware, however, that if primary school education was limited to the four examinable subjects, students would not receive a complete education if they dropped out after primary school (Vyapoory, 1984).

A similar problem has occurred in some programs where farms or workshops have been attached to schools. Often training did not occur while the students performed the manual work. The "self-reliance work activity" on the farm was separate from the rest of the school work.

Teachers oversaw the students' work rather than assist them to achieve educational goals. One study (Besha, 1973), found students to be extremely cynical about the self-reliance activities. The students stated that, "The inspectors expected to see us farming. Our headteacher wanted to please the politicians." Often local education officials evaluated self-reliance activities according to the amount of production rather than the amount of learning (Mbilinyi, 1977). Mbilinyi suggested that there was an obvious opportunity during farm work to teach mathematics while keeping account of the inputs and outcomes of the school garden, teach soil chemistry and crop husbandry while experimenting with the garden, and teach geography while surveying different vegetable plots.

Similarly, although basic education in India was intended to influence the curriculum of primary schools by introducing practical work skills, community activities, physical education, and arts and crafts, these changes rarely occurred. Because of inadequate facilities or a poor understanding of the new curriculum by teachers and the community, the suggested changes rarely occurred. The schools continued to stress academic work through rote memorization of facts. Daily life-skills were more or less neglected (UNESCO-UNICEF, 1978).

Recommendations for Curriculum Improvement

Reviewers of curricula used in Developing Countries have made a number of recommendations for improving various aspects of these curricula. Some of these recommendations are reported below. Several of the recommendations have been made with reference to regular education. Some recommendations refer to special education. Since all of the recommendations appear to relate equally well to both regular and special education no discrimination is made in the list that follows.

Merge the school and community; teach in both environments

1. For meaningful learning to take place, it is important that functional skills be taught in meaningful situations in the community in which the students live. Otherwise, confusion prevails in the students' minds. The result is memorization of fragmentary facts in isolation from their setting and meaning. In short, education should be related to the students' life and environment. As far as possible, direct, everyday experiences should be introduced into the classroom. For example, a discussion about clouds should not be confined to classroom texts and pictures, but, as much as possible, should extend to the out-of-doors (Duminy, 1973).
2. Productive work should become a part of schooling at all levels. Children should learn academic subjects and specific skills in the process of work (Ahmed, 1983). They should learn that the separation between mental and manual work, so salient in traditional forms of schooling, is a false one (Mbilinyi, 1977). Arrangements should be made with industrial and other productive enterprises for mutually

advantageous support of the school's productive activities. For example, sub-contracts to the school and student participation in factory work should be arranged. Flexible school timetables, including shifts for study and work, and time-release arrangements should be adopted to permit students to participate in productive work at school and outside (Ahmed, 1983).

3. Ways should be explored for converting present primary schools into Community Education Centres and reorganizing work in the school to fit with the life of the village. Students should be taught in school as well as in other places in the community where knowledge is available, for example, at the nursery school for child care, at the community farm for agriculture, and at the village workshop for carpentry (Mbilinyi, 1977).
4. Simple workshops such as carpentry, pottery, smithery, etc. should be established in primary schools. The schools should be integrated with the community in which a local craftsman could be employed to assist pupils (Mbilinyi, 1977).
5. Education should take place in a variety of places: in schools, at home, in the marketplace or elsewhere. This functional approach provides a greater opportunity for reaching disadvantaged children (UNESCO-UNICEF, 1978).

Evaluate the community environments surrounding the school

1. Understanding the impact of the school on students depends on understanding the social, political and economic context in which the school and the students are placed (Mbilinyi, 1977).
2. Hawkins (1980) wrote that, in a country where most people are rural dwellers, and where the majority rely on agriculture for their livelihood, the basic principles of conservation and agriculture should form the basis of the school curriculum.
3. Learning needs should be *functional* in that they should prove useful to different groups of people for different purposes. Learning needs can be identified by an analysis of the local ecology (IIEP, 1977).
4. For both regular and special education, a broader universal vision based on African economic, social, political and cultural facts is needed to create a solution that best suits the African child in the African context. Special and regular education will follow a dysfunctional track unless the outcome leads to full and better use of the socioeconomic environment (Csapo, 1987). Education and productive activities should be related and adapted to local economic development needs, opportunities and programs (Ahmed, 1983).

Evaluate long-term trends/needs

1. Education in rural areas will have to respond to both immediate and long-range needs of individuals, their families and the community (IIEP, 1977).
2. From the outset, the educational program of a student with a handicap should be based on the long term goal of his/her ability to function adequately as an adult. The entire school education of a student with a handicap can be seen as a preparation for future vocations. Curriculum planning should begin with this purpose in mind (Hulley & Templer, 1984).
3. No vocational program should be planned without a careful assessment of current and projected community needs. The curriculum should be future oriented. Trainers should be able to assess the demands of certain skills so that students are not prepared for skills that may not be profitable in future (Chege, 1984).
4. Vocational training should be offered in occupations that will be needed far into the future (Moriyama, 1982).
5. Ideally, vocational training should begin at the pre-primary level and continue until vocational ability is attained (Csapo, 1987).
6. All training in crafts should be closely related to the post-primary, vocational training the students will receive later (Csapo, 1987).
7. It is important that each individual have sufficient skill to hold one or two jobs, live in one or two residential arrangements and spend his/her free-time constructively (Duminy, 1973).
8. The aspirations of rural people to social mobility (add: including migration to urban centres) for themselves or their children are valid. ... Rural people should not be deprived of the kind of education that maximizes their chances for social and economic improvement (Barber, 1981).

Employ a variety of instructional personnel

1. While schoolteachers were originally the primary mediators of learning, additional mediators should be used to support learning of the deprived, underprivileged young (UNESCO- UNICEF, 1978).
2. Schools should be integrated with the community so that local craftsmen can be employed to assist pupils (Mbilinyi, 1977).
3. Ahmed (1983) suggested that, with respect to non-formal education, teaching personnel may include priests, local artisans and performers in folk arts rather than only certified teachers sent from the capital.
4. The typical personnel structure in education can conceivably shift from mostly certified professionals to mixed teams of professionals and subprofessional aides, monitors and supervisors. Not all of these people need be full-time employees with specialized training and professional certification. This approach need not lead to

substandard teaching if the teaching functions are reorganized in ways that permit the different levels of responsibilities to be shared by members of the team under the overall guidance of professionally qualified people (Ahmed, 1983).

The curriculum should teach functional knowledge and skills

1. Subject-centred curricula have to be replaced by a life-centred basic education (Csapo, 1987).
2. In India (Joshi 1981), the split between theoretical instruction and practical work was to a large extent responsible for the unsatisfactory educational progress of the young. Teachers, therefore, should coordinate theoretical instruction and practical work. It is imperative that education should be life-centred and related to gainful occupations. The specific skills and knowledge taught correspond to the locality in which the educational institution is located and will, therefore, be different from region to region.
3. The key to a meaningful education is relevance. It is critically important to plan educational programs that will develop in children the skills needed to live and function adequately as adults. Specific skills are those that are adaptive to the social, vocational and economic environments in which the students live. For example, in a predominantly agrarian setting, students and society will benefit from a domestic, agricultural and animal husbandry emphasis in the curriculum. In times of economic crisis, when employment opportunities are limited, skills developed for self- employment such as repair and maintenance work, and cottage and service industries would be more appropriate, whereas in a technologically sophisticated society, operation, management and maintenance of machinery and gadgetry would be considered necessary skills (Hulley & Templer, 1984).
4. Educators should design curricula that place greater emphasis on job training experiences, work training, sheltered workshops and training for independent living. Such curricula should include training in the areas of vocational, social and educational skills. Currently, many schools are concentrating only on educational skills (Karuga, 1984).
5. Students in sheltered workshops should be taught independent living skills such as simple cooking, bed-making, house cleaning, washing and ironing clothes, budgeting, family life education, and social etiquette, etc. (Karuga, 1984).
6. The UNESCO-UNICEF basic needs curriculum, recommended for under-privileged children (1978), included the following skills:

School: communication: reading and writing; numeration and computation, as well as knowledge of civic, social and political institutions and their functions.

Home and family: safe water supply; waste disposal; types and functions of foods; nutritional education; types and functions of simple tools; types and functions of joint family tasks: cleaning and tidying; preparing, collecting and purchasing simple things; interpersonal relations; and coping with simple sicknesses, bereavements and other similar events in the family.

Other: domestic and cultural practices; civic rules and conventions in routine life, festivals and harvesting; vocational considerations: use of seeds, fertilizers, tools, machines, environmental protection and conservation; growing, storing and consuming more and better quality foods.

7. A study conducted in the Philippines by INNOTECH (UNESCO-UNICEF, 1978) concluded that life-skills were valuable for all children to learn, whether or not they left school at an early age. For children who dropped-out, additional learning, necessary for higher levels of education, was an inefficient use of school time, but it was necessary for those who continued. It was suggested that the solution to this dilemma may lie in teaching all children the core life-skills in the early grades followed by a period given over to academic preparation.

8. The Kwamsisi Rural Community School Project (UNESCO-UNICEF, 1978) identified the following life-skills to be included in the curriculum (the extensive list has been significantly abbreviated):

   Knowledge of, commitment to, and competence in:
   - types and functions of foods, their simple nutritional aspects and their uses;
   - selecting, preparing and consuming suitable foods;
   - selecting and using proper clothing;
   - producing, storing and marketing food, clothing, etc.;
   - safe and proper use of modes of transportation and communication facilities;
   - using a variety of simple tools;
   - participating skillfully in play and recreation, in and around the home;
   - performing joint, family tasks: cleaning, tidying, preparing, and purchasing simple things and maintaining the home and surrounding environment;
   - alleviating suffering in the context of simple sickness, bereavements and other family events;
   - participating in significant domestic and cultural practices and relevant civic rules and conventions (at harvest time, festivals, and in routine living);

- functioning appropriately within informal groups, small and large, such as the family and extended family;
- following healthful practices in breathing, feeding, resting, excretion and sleeping;
- communicating (listening, speaking, reading and writing.);
- learning simple practices conducive to conservation and recycling of useful materials and energy resources, in and outside of the home; and
- using appropriate techniques of storing, collecting and caring for materials, tools, implements and machinery.

9. The curriculum developed by the School of Hope in Kingston, Jamaica teaches the following sex education skills in its curriculum designed for students with mental retardation.
   - Give accurate information about sex; dispel myths about it.
   - Inform students about the physiology of the human body.
   - Prevent students from getting involved in sexual behavior that will make them outcasts of society.
   - Enrich the lives of students by helping them enjoy sexual expression according to their abilities.
   - Dispel fear of pregnancy by informing students about birth control.
   - Help students avoid situations where they could be sexually exploited.
   - Help students develop healthy relationships with the opposite sex.
   - Help students discuss sex in relation to culture, expectations and male/female sex roles.
   - Provide insight into the nature of a marriage.
   - Help students establish a realistic family life.

Each of the foregoing recommendations has been incorporated into a method of curriculum design described as the "ecological inventory" discussed in Chapter Three.

Chapter Two

Problems Arising from the Adoption of Western Curricula

The goals of this chapter are to:

a. discuss the limitations of norm referenced, developmental curricula designed in North America and Europe, when used in Developing Countries;

b. introduce the concept of ecological validity;

c. discuss the limitations of curricula developed on the basis of a cross-sectional analysis of tasks average children can perform, when the curricula are used by handicapped students;

d. discuss the concepts of essential, nonessential, functional, nonfunctional and compensatory skills;

e. review some of the problems associated with teaching readiness, sensory, perceptual and preacademic skills, and "developmental milestones";

f. discuss problems associated with skill generalization; and

g. present a number of conclusions and recommendations regarding the development and/or adoption and modification of curricula. Lists of functional and nonfunctional tasks are provided for review.

A number of problems arise when curricula designed in North America and Europe are adopted for use in Developing Countries. Many curricula used in North American kindergartens and primary schools as well as with older students functioning at lower age levels are referred to as "norm referenced, developmental curricula." The skills taught in these curricula are selected by making a cross-sectional analysis of the tasks performed by *average* children in *average,* North American environments. Several problems occur when curricula are developed in this manner.

a. The tasks listed in these curricula relate to North American environments. The curricula may not be *ecologically valid* for use in Developing Countries.

b. The curricula may not list all of the essential tasks within any one area of performance; in addition, a number of non-essential tasks may be listed.

c. The unique compensatory skills required of individuals with particular types of handicaps may not be included in the curricula.

d. A curriculum developed without reference to the environments in which the tasks must eventually be performed may result in the skills being taught in isolation from that environment. Consequently, skills taught in a training environment may not generalize to the natural environment.

e. In addition, some of the adopted curricula, teaching readiness, sensory, perceptual and preacademic skills, are based on approaches that have fallen into disfavor since the curricula were first developed.

Each of these concerns is discussed in the remainder of the chapter.

Ecological Validity

Curricula designed on the basis of a cross-sectional analysis of the tasks performed by *average* children in *average,* North American environments are sometimes accepted as universal standards of child development to which all children are compared. Therefore, if a child of five years of age, living in a rural area of a Developing Country, is found to be unable to stack five rings on a peg in order of size (a task usually performed by North American children at approximately three years of age), a remedial program is developed to teach the child to perform this task. This approach fails to acknowledge that a) the tasks children can perform at each age level are a function of the experiences they have received, and b) the skills required at any age level are a function of the environments in which the children live.

Children living in rural fishing villages in Jamaica have had different life experiences than children living in New York city. As a result, some children in New York city are unable to perform tasks Jamaican children of the same age commonly perform. Because a child in New York is unable to a) trap crayfish in a stream, b) get milk from a coconut, or c) identify a ripe plantain is not sufficient reason to develop a remedial program to teach him to perform these tasks. Similarly, because a Jamaican child cannot a) copy a pattern in a pegboard and/or b) assemble an interlocking picture puzzle is not sufficient reason to develop a remedial program to teach her to perform these tasks (Baine, 1987a).

A curriculum designed for children living in one environment may not be *ecologically valid* for children living in another environment. A curriculum designed for one environment may teach skills *not* required in another environment, and may fail to teach skills that *are* required. Ecologically valid curricula teach skills that are functional in particular environments. *Functional skills* are those *required* in the environments in which a person currently performs and/or in which she/he will perform in future. Functional skills are described later in this chapter and the next.

Teaching Essential and Nonessential Skills

A curriculum developed on the basis of a cross-sectional analysis of the tasks average children can perform may not list all of the essential skills

within any one area of performance. In addition, a number of non-essential skills may be listed in the curriculum. For example, in one well-known North American curriculum, one of the higher level tasks children are taught is to print their first names. Related tasks taught at earlier age levels in the curriculum are a) copy a vertical line; b) copy a horizontal line; c) copy a circle; d) copy a plus sign; e) copy a "v"; f) draw a diagonal line from corner to corner of a piece of paper, 4" square; g) copy a series of connected "V-strokes," and h) copy a triangle.

These tasks do not teach all of the essential subskills handicapped children require when learning to print. The sequence of tasks does not provide any practice in actually printing letters. For example, the circles and vertical lines taught are not systematically joined to form the letters "d, b, p and q." These most confusing letters of the alphabet present frequent problems for mentally retarded and learning disabled children. No systematic practice is given in sequencing letters in a left-to-right direction. Sequencing problems are common among many handicapped children.

Some nonessential skills are taught. For example, children are taught to draw a diagonal line from one corner to another of a piece of paper, 4" square. This uncommon task is never required during writing. Similarly, children are taught to draw a series of connected "V-strokes." If a child repeatedly drew letters in this manner during printing, she/he would be diagnosed as "perseverative" and would be referred for remediation. In fact, children being taught to print must be taught to copy a model accurately without adding or deleting essential features (Baine, 1987a).

It is apparent that curricula built simply by identifying the tasks children at various age levels can perform may not teach *all and only the essential subskills* required for higher levels of performance. An alternative procedure for selecting the tasks to include in a curriculum is to a) perform an ecological inventory to identify the essential, functional tasks children are required to perform at higher age levels, and b) task analyze these tasks to determine what subskills are required. Methods of performing ecological inventories and task (performance) analyses are discussed in the next chapter.

Failure to Teach Unique Compensatory Skills

When a curriculum is developed on the basis of an analysis of the tasks *average* children perform, it is unlikely that the curriculum will teach the unique compensatory skills required of individuals with particular types of handicaps. For example, blind children are required to a) listen to echoes to predict distances; b) learn to examine objects through the sense of touch and c) walk through dense, moving traffic they are unable to see. Curricula used with any student with a handicap should teach the unique skills required of persons having that type of handicap.

Teaching Skills in Isolation from the Natural Environment

A curriculum developed without reference to the environments in which the tasks must eventually be performed may result in the skills being taught in isolation from those environments. As a result, skills taught in training environments may not generalize to natural environments. For example, a child may be taught to find a ball under a blanket. However, because the exact parallel of this task may not occur in the natural environment, and because the searching task may occur infrequently in any form, the skills learned may not generalize to the natural environment and may be forgotten before they are required. Alternatively, if "searching skills" were taught *when* they are required in the natural environment, and in the same *form* as they are required in the natural environment, "searching skills" would more likely be used and remembered. Ecological inventories, discussed in the next chapter, are used to identify tasks that are functional (required) in particular environments. These inventories identify where and when each task is required and the form in which it must be performed. For example, an inventory conducted of children living in particular rural environments may reveal that at a certain age the children should be taught the "search skills" of finding eggs in nests in which there may or may not be a) chickens sitting, b) eggs covered with straw, and c) zero, one or more eggs per nest.

In addition, some of the curricula adopted from North America or Europe are based on approaches that have fallen into disfavor since the curricula were first developed. The teaching of readiness, sensory, perceptual and preacademic skills are discussed in the following paragraphs.

Teaching Unnecessary Readiness and Preacademic Skills

Readiness or preacademic skills are taught to pupils to "get them ready" to learn to perform higher level academic tasks requiring the same skills. For example, students are sometimes taught to discriminate and sequence circles, squares and triangles to "get them ready" for the academic tasks of discriminating and sequencing letters and words in reading. The ability to perform the "readiness tasks" has been thought by some people to be prerequisite to higher levels of performance because average children living in average, North American and European environments are typically able to perform these readiness tasks before they can perform higher level tasks (Baine, 1987b)

Sippola (1985) cited several research studies supporting the conclusion that preschool and kindergarten children are better prepared for reading by learning to discriminate and sequence letters and words than they are learning to discriminate and sequence geometric forms. Frequently, the skills learned in working with geometric forms do not *generalize* to working with letters and words. Although there are similarities between sequencing geometric shapes and sequencing letters

in words, there are critical differences. For example, decoding words involves the integration of letter and sound correspondences, skills that do not apply to sequencing shapes (Velluntino, Steger, Moyer, Harding & Niles, 1977). Sippola (1985) concluded that reading readiness is best enhanced through the learning of "reading specific skills," such as visual discrimination and sequencing of the letters of the alphabet.

Readiness for hearing the differences between various words is sometimes taught by having children learn to distinguish sounds commonly found in the environment. For example, children in North America may be taught to recognize the difference between the sounds of a roaring jet and a rumbling truck. Sippola (1985), after reviewing several related research studies, concluded that teaching children to recognize differences between sounds that have nothing to do with reading is sheer nonsense. Frequently, improvements in the ability to discriminate various sounds in the environment does not *generalize* to improvements in discriminating the sounds in words. It would be better to concentrate directly on the recognition of "reading specific skills," such as the differences between initial consonant sounds.

As a reading readiness activity, children are sometimes taught to remember a random series of numbers to improve their auditory memories. Gersten and Carnine (1984) concluded, after reviewing the research, that memorizing numbers is unlikely to improve reading in an appreciable manner. Improvements in recall of numbers does not *generalize* to improvements in recall of sounds in words.

These authors also reviewed 106 research studies of the relationship between auditory perceptual skills and reading. These studies were concerned with the effects upon reading of teaching auditory discrimination, auditory blending, auditory memory, auditory-visual integration and auditory comprehension. Normal functioning children and those with learning disabilities were studied. The results indicated that these auditory skills had a very weak relationship with reading.

A large number of research studies in which children were taught visual perceptual, reading readiness skills, such as those listed below, found no significant improvement in reading (Hammill, 1982; Hammill & Wiederholt, 1973).

a. Eye-hand coordination, e.g., tracing between parallel, straight and curved lines.
b. Figure-ground perception of geometric shapes, e.g., tracing the outline of geometric figures embedded in a background of other shapes.
c. Discrimination of rotations and reversals of figures, e.g., selecting from five pictures of chairs, in various spatial orientations, a picture of a chair in the same orientation as a sample chair.
d. Copying simple to complex patterns.

Hammill (1982) concluded that auditory and visual perceptual training had little if any educational value. He recommended that generic, perceptual activities should never be taught in the hope that somehow improvements in perception will *generalize* to reading, speech or other academic activities.

Similarly, although tracing is often used as readiness training for copying and writing, there is little evidence available demonstrating that improvements in tracing will result in improvements in printing. In fact, several studies have reported no benefit from teaching tracing (Brittain, 1969; Goodson, 1967 and Rand, 1971). Apparently, *generalization* of learning from tracing to copying is influenced by the fact that children in kindergarten and grades 1 and 2 trace and copy in different ways (Bernbaum, Goodnow & Lehman, 1974). Although there are similarities between tracing and copying, there are also critical differences that influence generalization of skills from one task to the other.

Most speech and language training programs for low functioning learners emphasize the importance of teaching children to imitate motor actions before introducing imitation of speech sounds. The research evidence, however, does not seem to support this approach. Improvements in imitation of motor actions frequently do not generalize to improvements in imitation of speech. Furthermore, it is clear that imitation of verbal behavior can be established in the absence of imitation of motor behavior (Reichle, Rogers & Barrett, 1984).

Sometimes, it is assumed that the skills normal children generally acquire at particular ages are *prerequisite* to skills at higher levels of development. As a result, children with handicaps are taught the skills acquired by young, normal functioning children before being taught more advanced skills. Bailey and Wolery (1984) have described several problems associated with building an early childhood curriculum for children with handicaps on the basis of a developmental model of normal child development. First, "developmental milestones" (behaviors characteristically performed by normal functioning children at particular age levels e.g., the age at which children usually learn to build a pyramid of blocks) are not necessarily good skills to teach. The original purpose of establishing developmental milestones was to distinguish between children at different developmental levels, not to serve as indicators of the best skills to teach young children. Second, the sequence in which skills usually develop in normal children may not be the best sequence for teaching those skills to normal functioning or handicapped children, particularly those having severe or profound retardation or those with physical or sensory impairments (Adelson & Fraiberg, 1975; Guess, Sailor & Baer, 1976). The ability to stack blocks may not be useful to a child in the natural environment, and the skills associated with stacking blocks may not generalize to functional tasks.

In conclusion, improvements in readiness skills frequently do not generalize to improvements in academic skills. A number of researchers

have concluded that rather than teach readiness and *pre*academic skills, academic skills should be taught *directly* in the *form* in which they must eventually be performed. For example, rather than analyze reading into sensory and perceptual skills, it would be more effective to analyze reading into *subskills* that are actually *components* of reading, and to teach these skills *directly* (Velluntino, Steger, Moyer, Harding & Niles, 1977). When a skill is taught directly in the *form* in which it must eventually be performed, no generalization is required.

Problems of Failure to Achieve Skill Generalization

The failure of improvements in readiness and preacademic skills to generalize to improvements in academic performance is referred to as a failure of response generalization. *Response* generalization occurs when a person taught to make a particular response, without further instruction, learns to make a functionally similar but different response under equivalent but different conditions. For example, in readiness training, response generalization would occur if a student taught to sequence geometric shapes, without further instruction, learned to sequence letters in words. There is an increasing amount of clinical and empirical evidence suggesting that learning disabled children have particular difficulty with response generalization. Some researchers consider response generalization to be a major factor in children's learning problems (McLeskey, Rieth, & Polsgrove, 1980). Because response generalization affects many areas of education, the discussion is continued below.

Welch and Pear (1980) found that when picture cards were used to teach children with severe to moderate retardation to label objects, there was little generalization of the labeling response to actual objects in the natural environment. However, when real objects were used during initial training, generalization improved.

O'Hare and Hogan (1983) found that when students with moderate to mild retardation were taught to conserve number and substance in Piagetian tasks, the skills did not generalize to other conservation tasks involving quantity and weight. In fact, research from studies of a variety of children (Brainerd, 1978; Feldman, 1980; Fischer, 1980; Reese, 1977; Seigler, 1981) have found that children who have demonstrated the skills characteristic of one stage of Piagetian development (e.g., conservation) will often be unable to perform tasks from the same stage of development that require the same skills. The skills have not generalized to other tasks requiring the same skills.

Minsky, Spitz and Bessellieu (1985) trained adolescents with mild to moderate mental retardation to solve the Tower of Hanoi problem. Each subject was given two boards on each of which there were three pegs with disks of graduated size arranged in a particular pattern. One board provided a sample organization of the disks. Each subject had to reorganize the pegs on the other board to match the organization on the sample board. The skills learned from this task failed to generalize when the disks were replaced by figures of a different shape requiring the same

skills. The authors reported that the results of this study supported their conclusions, as well as those reported in the literature (e.g., Campione, Brown & Ferrara, 1982), that an important limitation of training retarded persons is their inability to generalize newly acquired skills to novel, though similar, situations.

Conclusions and Recommendations

1. One should not conclude from the foregoing discussion that response generalization *will not* occur, but that it *may not* occur. It is impossible to teach students to perform each of the infinite variety of specific tasks they will be required to perform. The goal of all education is to teach students to apply what they have learned to new problems that differ in at least some details from those they have previously experienced. The essential conclusions to be drawn from the foregoing discussion are as follows.
   a. One cannot assume that response generalization will automatically occur. If the skills learned in nonfunctional tasks do not generalize, the time taken to provide training has not only been wasted, it has also been harmful. The time used to teach the nonfunctional skills could have been used to teach functional skills. Since students with handicaps are already behind the achievements of students of the same chronological age, and because they are slow to learn, inefficient instruction will result in handicapped students falling even further and further behind average students.
   b. If response generalization may not occur, it would be more efficient to teach functional skills *directly* in the *form* in which they must eventually be performed in the natural environment.
   c. When a student has learned to perform a functional skill in the form required in the natural environment, no generalization is required. If the skills learned do generalize to other functional tasks, a secondary benefits will have been gained.
2. The following tasks, frequently found in curricula, are not functional tasks. Ordinarily, outside of school, students are not required to perform any of these tasks in the form in which they are taught. To be useful, the skills learned in these tasks must generalize to functional tasks.
   a. Building a tower of blocks.
   b. Putting pegs in a pegboard.
   c. Reproducing a repeated block or bead pattern.
   d. Completing an interlocking picture puzzle.
   e. Matching circles, triangles and squares.
   f. Putting a set of nested cups together.
   g. Putting a series of cylinders in order of increasing size.

h. Playing pat-a-cake or peek-a-boo.
i. Walking heel-to-toe on a balance beam.
j. Drawing a line through a maze.
k. Stringing beads.
l. Finding a ball hidden under a blanket.
m. Inserting geometric shapes into a formboard.
n. Matching color cards.

3. These tasks should be replaced by functional tasks taught in the form in which they must be performed in the natural environment. Brown et al. (1979) have demonstrated that adolescents and adults with severe handicaps, who according to their mental ages might have been taught to match block and bead patterns, and to put pegs into a pegboard, were taught a number of *chronological, age-appropriate, functional tasks* like food preparation, telephone use, shopping, bus riding and vocational tasks. The following tasks, not usually found in curricula, are functional in some rural environments:
   a. identifying sour milk or putrid food on the basis of appearance and/or smell;
   b. discriminating ripe from immature or damaged fruit and vegetables on the basis of color, appearance and texture;
   c. washing, peeling and cutting vegetables and fruit;
   d. caring for cuts, scrapes and infections;
   e. lighting a kerosene lamp;
   f. identifying and measuring flour, sugar and salt for cooking;
   g. planting seeds four inches apart;
   h. identifying the beginning sounds in spoken words;
   i. identifying the number of syllables in spoken words;
   j. discriminating the printed letters "d, b, p and q"; and
   k. accurately copying the letters "m, n, r and u."
4. To determine if a skill is functional, evaluate how critical or useful the skill will be to a student. For example, a curriculum may list "walking on a line" as a teaching objective. This skill is not usually required at home, at school or at work. In fact, it is very rare for adults, adolescents or children to use this skill at all. Thus, walking on a line is not a very critical skill. However, walking on a line does teach the underlying skills of dynamic balance and eye-foot coordination. These are critical skills. For example, an adolescent or young adult may need dynamic balance and eye-foot coordination to walk along a narrow footpath, walk through a narrow doorway, or walk between people in a market. Any or all of these tasks can be taught and the students will learn dynamic balance and eye-foot coordination. However, teaching a child to walk on a line may not result in direct

improvement in tasks such as walking through a crowd of people in a market. Thus, it is more efficient to teach functional skills directly.

5. Curricula designed for other countries, for example, in North America and Europe, may not be ecologically valid for use in Developing Countries. When these curricula are being considered for adoption, tasks should be identified that will not be functional in Developing Countries in which the curricula are intended to be used. Note should also be made of tasks that are essential to Developing Countries that are not listed in the curriculum. Functional skills essential to Developing Countries may be identified through the use of ecological inventories, described in the next chapter.
6. Curricula developed by a cross-sectional analysis of the tasks that normal functioning children can perform will not list the unique compensatory skills required of individuals having particular types of handicaps. These tasks may be identified by conducting an ecological inventory.
7. Curricula developed by a cross-sectional analysis of the tasks average children can perform may not list all of the essential skills within any one area of performance. The process of task (performance) analysis, described later in this text, is designed to identify all of the skills essential to performing specific tasks.
8. A curriculum developed without reference to the environment in which the tasks must eventually be performed may result in the skills being taught in isolation. As a result, skills taught in a training environment may not generalize to the natural environment. Ecological inventories identify functional tasks in specific environments. Skills should be taught in the same form in which they are required in the natural environment.
9. Readiness, sensory and perceptual skills frequently do not generalize to an improvement in the performance of academic skills. Skills should be taught only if they are subskills or components of functional tasks. Rather than rely on generalization, subskills and component skills should be taught directly in the form in which they must eventually must be performed.
10. The "developmental milestones" listed in a curriculum are not necessarily suitable tasks to teach. These tasks were initially identified because they distinguished children at various levels of development within particular cultures.
11. The sequence of skills listed in a curriculum designed on the basis of a normal developmental sequence may not be the best sequence for teaching those skills to students with handicaps, particularly those with physical or sensory handicaps.

The Special Education Division of the Community College of Micronesia (1986) has developed a Curriculum Guide for Teachers of Students

with Moderate and/or Severe Handicapping Conditions in Micronesia. The curriculum includes the following sections: instructional methods, self help (domestic skills), motor skills, communications skills, functional academic skills, vocational skills and leisure/recreational skills. The material includes descriptions of: quality programs, assessment strategies, individual education programs, task analysis, chaining, shaping, rewards, as well as data collection and recording. To some extent, the curriculum is based on an ecological inventory. Sections of the curriculum teaching skills most unique to Micronesia are the vocational and leisure/ recreational units. For example, the vocational unit teaches the following tasks: opening a coconut; boiling breadfruit; frying ripe bananas; grating coconuts; cleaning fish; lighting a kerosene lamp; cutting grass with a sickle; planting papaya; feeding pigs; husking coconuts, etc. Each skill taught has been task analyzed into a number of steps. Teaching suggestions are also made. In some of the units, each step of the teaching process is also described. In many respects, these materials provide a good example to imitate.

Chapter Three

Using Ecological Inventories to Develop Curricula

The goals of the following discussion are to:

a. review the advantages of using ecological inventories to develop curricula for handicapped persons in Developing Countries;
b. review the general features of ecological inventories;
c. describe, in detail, the steps taken to conduct an ecological inventory;
d. provide an abbreviated inventory guide and recording form;
e. make suggestions for adopting the ecological inventory approach to develop curricula for *groups* of persons with particular types of handicaps, and
f. discuss how to develop curricula for *individual* students within groups.

Ecological Inventories

Ecological inventories are used to identify the common, daily, functional tasks nonhandicapped and handicapped persons, in particular environments, are required to perform. The *tasks* identified are then listed in a curriculum. In the discussion that follows, *generic* methods are described for using ecological inventories to develop curricula for children and youth, with handicaps, living in Developing Countries. These methods integrate the recommendations described in the previous chapter for improving curricula. Curricula developed by the methods described below have the following characteristics.

a. The curricula, based on a comprehensive environmental analysis, are *ecologically valid* for specific cultural, economic and geographic, urban and rural environments in *Developing Countries.*
b. The curricula provide a *comprehensive catalogue* of *norm referenced, functional* skills. From the catalogue, specific skills can be selected to build *individualized curricula* for a particular person or a group of persons having specific handicaps (see Note 1, *Norm-referenced curricula*, at the end of this chapter).
c. The curricula list *functional*, routine daily tasks, as well as academic, recreation, communication and social skills. These skills are required in *current* and *future* home, community, school and vocational environments.

d. Skills are listed that are *chronologically age-appropriate.* These skills permit individuals to live as independently and in as least restrictive and normative a manner, as possible (see Note 1, *Norm-referenced curricula*, at the end of this chapter).

e. Also listed are *compensatory skills* required of persons having specific types of handicaps.

f. Tasks listed in the curricula are described in detail. For example, equipment, materials, adaptations, etc. related to each task are described. This information makes it possible to teach each task in the same *form* as it is performed in the natural environment. Teaching in this manner improves generalization and maintenance of learning. Teaching methods are discussed in Chapters Four and Five.

The ecological inventory method

The procedures discussed in this chapter are described in considerable detail. If all of the cognitive, motor and sensory aspects of riding a bicycle were described in the same detail, the reader might feel overwhelmed by the apparent complexity of the task. Yet most people learn without difficulty to ride a bicycle. Similarly, most readers can learn to use ecological inventories to develop curricula.

Note too, that in this chapter, the *ideal* form of an ecological inventory is described. This approach could be readily adopted if sufficient time, money and expertise were available. In some situations, most or all of the techniques described may be readily adopted. In other situations, the ideal may be difficult to achieve. In this case, the ideal may represent a *long term goal* to work toward. Methods of working toward the ideal are described later in the chapter.

The methods of ecological inventory discussed are based on modifications and extensions of the procedures described by Brown, Branston, Hamre-Nietupski, Pumpian, Certo and Gruenewald (1979), Brown, Shiraga, York, Zanella and Rogan (1984), and Wilcox and Bellamy (1982). To reduce the complexity of the text and to preserve the flow of the discussion, several long notes relating to technical details have been put at the end of the chapter. Readers may refer to these notes during a second reading of the chapter.

Conducting an ecological inventory

1. Identify the type of persons (*target group*) for whom the curriculum is being designed. The target group is identified by: age, type of handicap (e.g., sensory, physical and/or intellectual), level of functioning (e.g., mild, moderate, severe or profound), linguistic/cultural characteristics (e.g., Muslim, Hindu, Bengali); socioeconomic level (e.g., slum dweller, lower class, middle class, upper class); caste (e.g., Brahmin); geographic region (urban, rural) and regional economy (e.g., fishing, farming, industrial, combination). For

example, the target group of students may be defined as trainable, mentally retarded, 6-9 years of age, of mixed caste Hindus, living in middle to upper class regions of a rural, farming village.

2. Select for study a wide variety of *families* to *represent* the range of characteristics of the target group. Each family selected should have at least one handicapped person from the target group and at least one NONhandicapped *sibling* (brother or sister) of the same sex and similar age as the person with the handicap. A sufficient number and type of families should be selected to represent the full range of levels and types of handicaps, ages, different castes, etc. as those of people in the target group. If it is not possible to select families having siblings of the same sex and similar ages, it will be necessary to study families of normal functioning persons outside the target group. This approach will require additional time, and it may be difficult to get the cooperation of families that will not benefit directly from the study.

To establish a norm referenced curriculum, conduct an ecological inventory of the NONhandicapped sibling first

3. Identify the *boundaries* of the home, community, vocational and school environments (in that order) in which the NONhandicapped sibling currently performs. The extent to which an individual participates in each environment usually increases with age. The inventory begins with the home environment. Information related to other environments will be gained during the inventory of the home environment. The inventory of the school is conducted last. During the school inventory, an evaluation may be made of the ability of the school to teach the skills required in each of the other environments.

   Ideally, teachers and others involved in training should assist making an ecological inventory of each environment. (See Note 2, *Terminology*, at the end of this chapter).

4. In each environment, identify the *subenvironments* within which the NONhandicapped person is *currently* performing. For example, in a village, the community *environment* may include the following *subenvironments*: the village well, a recreational area, the river bank, a market, connecting roads and pathways, etc.

5. Predict the boundaries of *future environments* and subenvironments (see Note 3, *Prediction of future needs*, at the end of this chapter).

6. *Functional tasks* are identified that the NONhandicapped sibling performs in each current and future subenvironment. For example, at the village well, functional tasks may include greeting others, waiting one's turn to use the well, bathing (self and others), washing clothes, washing cooking equipment and getting drinking water.

Functional tasks are of two major types:

a. *tasks frequently required* in home, community, vocational and/or school environments; they include routine daily chores, as well as social, communication and recreational tasks related to the maintenance and development of the environment and one's physical, social, emotional and intellectual condition; and

b. *tasks of low frequency* but high importance, for example, attending a funeral, making an annual religious pilgrimage and coping with emergencies such as a hurricane and treating a scorpion bite.

These tasks are identified in three ways.

a. Parents may be given a specially designed *diary* in which to record, over one week, the sequence of common daily tasks (routine chores, as well as recreation, communication and social tasks). Questions in the diary also prompt recording of low frequency tasks of high importance, and recording of tasks performed only during annual, seasonal, emergency or special events. The diary helps to remind parents of information related to the inventory. The diary may also assist the interview that follows. If parents are unable to read and write, it may be desirable to talk to a group of parents at least one week in advance of the interviews. Tell them what tasks to observe over the next week. It may also be helpful to give the parents a reminder (book or picture, etc.) that they may display at home to remind them of the need to observe and recall. Similar approaches may be used with teachers and employers.

b. *Interviews* are conducted with parents, teachers, children, employers and others.

c. *Observations* may be conducted of nonhandicapped persons and persons with handicaps. The interview and observation procedures are described below.

7. Following the ecological *inventory of the NONhandicapped sibling*, an inventory of the person with the handicap is conducted. This inventory is designed to:

a. identify all *current subenvironments* in which the person with a handicap performs but the normal functioning person does not (e.g., specialized, medical treatment centre); in each of these subenvironments list all tasks that the person with the handicap performs *in*adequately;

b. identify all *future subenvironments* in which the person with a handicap will perform but the NONhandicapped person will not (e.g., sheltered workshop); list all tasks required of the person with the handicap in each of these subenvironments; and

c. identify all unique or *compensatory tasks* the person with a handicap will have to perform in current and future environments as a

result of the nature of the handicap (e.g., adjustment of leg braces or calipers).

8. Following the ecological inventory of both the person with the handicap and the NONhandicapped sibling, *rate the relative importance of each task* using the Task Importance Rating Scale described below. Tasks that are rated as relatively unimportant are eliminated from further consideration. The remaining tasks are organized into a catalogue according to the environment(s), and subenvironment(s) in which they are performed. A *catalogue* is a comprehensive list of tasks, relevant to a broad variety of persons. Selected tasks relevant to a particular person may be selected from the catalogue. The relative importance of each task (e.g., low, medium, or high) is shown in the catalogue. For example, in the home *environment*, in the kitchen *subenvironment*, food and water storage tasks may involve: spraying for insects (H), cleaning food and water containers (H), and storing food in clean, dry, cool and insect protected locations (H). Each of these tasks has been rated as high (H) in importance.
9. The *catalogue* lists a broad variety of functional tasks nonhandicapped persons of a particular age, cultural and socioeconomic level, living in an urban or rural environment, in Developing Countries, are required to perform. In addition, the catalogue lists a number of unique functional tasks individuals having particular levels and types of handicaps are required to perform in home, community, vocational and school environments. It is unlikely that any particular individual or group of individuals with specific types of handicaps would be required to learn all of these tasks.

   To develop a *curriculum for a particular person* or group of people having specific handicaps, the catalogue is reviewed, and selected tasks are chosen to include in the curriculum. An attempt is made to select a suitable number of tasks from each of the following categories a) home, community, vocational and school; b) tasks required in current and future environments; as well as, c) routine chores, communication, recreation, and social tasks. The appropriate number of tasks selected from each category depends upon the level of functioning of the people involved, the number and type of skills they already possess and the number and type of skills required. Some older students may have learned most of the basic home and community tasks; the major emphasis in their curriculum may be vocational. Other students, unable to learn vocational skills, may benefit from a greater emphasis on home and recreational tasks. For other students, a focus on academic skills may be most appropriate.

   Teachers using the curriculum would *task analyze* each task to determine the skills a student or group of students must be taught to enable them to perform the task. Task analysis, at this stage, permits

analysis of each task into large or small teaching units suitable to the learning abilities of particular students. Alternatively, if it is likely that teachers using the catalogue will not have sufficient time and/or skill to do a task analysis, the tasks can be analyzed by curriculum developers before the catalogue is made available to teachers.

Comprehensive, Ecological Inventory Guide

The following section describes, in detail, the steps taken to conduct an ecological inventory by *interviewing* various *informants*, e.g., mother, teacher, employer, etc. Refer to Note 4, *Limitations of interview information*, at the end of this chapter. Following this detailed description, an *Abbreviated Inventory Guide* and an *Inventory Recording Form* are provided.

1. Select one *environment* for inventory; inventory environments in the following order: home, community, vocational, and school. Identify *informants*: mother, teacher and employer, etc.

   As was previously mentioned an ecological inventory of the NONhandicapped *sibling* (brother or sister), of the same sex and similar age as the person with the handicap, is made first. If it is not possible to select families having siblings of the same sex and similar ages, it will be necessary to study families of normal functioning persons outside the target group.

2. With the assistance of the informants identify the *subenvironments* in the environment being inventoried. In each environment, identify those subenvironments in which the person being inventoried currently performs or in which she/he is expected to perform within the next three to five years.

A. *Home*: Note, that the home environment includes the building in which the family lives (eats and sleeps, etc.). The home may also include the immediate surrounding area, including private or shared toileting, bathing and water facilities, animals and a nearby garden plot each of which is considered to belong to the family rather than to the community.

   The home environment may include some, all or other than the following subenvironments:

   a. toilet: indoor or outdoor;
   b. personal bathing area: indoor or outdoor;
   c. area for food storage, preparation and cooking;
   d. family garden plot (beside the family residence);
   e. family water source and storage (beside the family residence) may include cistern, or pipe well etc. does not include community well;
   f. family eating area;
   g. family sleeping area;

h. verandah or porch;

i. area for animals (in, or next to the family residence); may include area for cattle, fowl, goats, pigs, sheep, etc.;

j. area for family recreation (indoor and outdoor); if outdoor, beside the family residence;

k. family worship area, e.g., family shrine in home, and

l. student study area in the home.

B. *Community*: the community environment may include some of, all of, or other than the following subenvironments. *Note: the sub-environments to be identified are only those in which the person being inventoried is currently involved or in which she or he will likely be involved in the future.*

a. Travel routes (e.g., paths, streets, avenues, highways, canals, rivers, etc.) within the village, town or city.

b. Shops, stalls, stores, markets, shopping centres, travelling vendors, etc., selling food, clothing, supplies, etc.

c. Cane crusher, flour mill, barber shop, restaurant and bank, etc.

d. Places of worship: mosques, temples, pagodas and shrines, etc.

e. Places of recreation: playing fields and swimming areas, etc.

f. Places of community meeting: community halls, etc.

g. Meeting place of the village council.

h. Tourist bungalow, rest house and/or hotel.

i. Health care centre, dispensary and/or hospital.

j. Post and telegraph office.

k. Bus and/or train station.

l. Area near canal, river or dock where industry, fishing, swimming, washing and/or communal meetings may take place.

m. Nursery, preschool, primary and/or secondary school or traditional school.

n. Police, fire or other emergency services.

C. *Vocational*: the vocational environment may include some of, all of, or other than the following subenvironments. *Note: the sub-environments to be identified are only those in which the person being inventoried is currently involved or in which she or he will likely be involved in the future.*

a. Rice paddies or fields where crops are grown, e.g., fruit or palm oil plantation (other than the family garden plot beside the family home).

b. Pastures where animals graze, buildings where they are housed, etc.

c. Places where crafts are made for sale rather than recreation (stone carving, jewelry, batik, pottery, weaving, etc.).

d. Places of work for mechanics, blacksmiths, carpenters, oil pressers, millers, masons, fishermen, cobblers, etc.

e. Shops, stalls, stores, markets, shopping centres, etc.

D. *School*: the school environment may include some of, all of, or other than the following subenvironments. *Note: the subenvironments to be identified are only those in which the person being inventoried is currently involved or in which she or he may be involved in the future.*

a. Internal: classrooms, passageways, offices, toilets, recreation area, assembly area, craft workshop, vocational training area, etc.

b. External: walkways, playing fields, toilets, vocational facilities: gardens, animal sheds, etc.

c. Academic: reading, language, arithmetic, science, history, crafts, etc.

3. *Interview* the informants to identify *all tasks* performed in each subenvironment. All of the information obtained from the following questions may be recorded on the inventory recording form.

Note: it is desirable, during the interview, to gain as much relevant information as possible. The more essential information that is included in the curriculum, the more useful the curriculum will be. When conducting an inventory for the first time, however, it may be difficult to get, record and use the information in a curriculum. Thus, initially, rather than attempt to get answers to all of the following questions, ask only carefully selected questions. The number and type of questions asked is determined by a) the time available, b) the skill of the interviewer, c) the purpose of the particular curriculum being designed and d) the ability of teachers to use the information made available. A comprehensive list of *interview questions* follows.

a. Ask, What routine, daily tasks are performed in the morning, afternoon, and/or evening in each subenvironment?

b. What communication, recreation and social tasks are performed in each subenvironment? (refer to Note 5, *Examples of communication, recreation and social tasks*, at the end of this chapter).

c. What seasonal tasks occur?

d. What tasks are performed during common, special events: religious holidays or ceremonies, birthday celebrations, etc.?

e. What tasks are performed during low frequency events of high importance, e.g., religious ceremony, fire, monsoon flooding?

f. What daily, seasonal, emergency, special event and low frequency tasks is the individual expected to learn to perform in the next three to five years, in each subenvironment? Record when the individual will be expected to perform the task, e.g., 1, 2, 3, 4 or 5 years. (see Note 3, *Prediction of future needs* at the end of this chapter).

g. For each task, record how often the task is performed (several times per hour; per day; per week; per month; per year). Record if the task is performed in one, several, or all environments. This information is used to determine the relative importance of each task.

h. For each task, record any special equipment, materials, conditions, adaptations or methods that are used. This information can be used to make the training environment as similar as possible to the natural environment to help generalization of learning from the training environment to the natural environment.

Note: during an interview, rather than interrupt the flow of discussion to obtain *all* of the desired information about each task being discussed, put a mark in your notes where further information is required. Review these points later.

Additional information may be obtained by the following methods.

a. Ask the informant who uses tools or equipment found in the subenvironment that have not previously been discussed. Also, ask what these tools are used for and if and when the person being inventoried will be expected to learn to use them in the next 3-5 years. In addition, if any tasks are apparent that have not been discussed, ask the informant who performs these tasks and if and when the person being inventoried will be expected to learn to perform these tasks in the next 3-5 years.

b. Parents and teachers may not be able to describe adequately the number and nature of tasks in which a person may become involved in the *community*. Also, because many of these tasks may not occur very often, it may not be possible to see the person perform many tasks. In addition, if the person is aware of being watched, his or her behavior may change. An alternative method, may be to interview the NONhandicapped person following the interview of the parent to determine where in the community he goes and what he does. Additional information may be gained by watching a random selection of people of the same sex and similar age as the person being inventoried who are performing in selected community subenvironments.

c. For some tasks, it may be desirable to have the NONhandicapped person show how she or he does a particular task.

d. *Note*: the *inventory of the school* includes an analysis of the tasks a student is required to perform in each area of the curriculum. For example, a student may be required to count from 1-100; write the numbers 1-100; add two single digit numbers e.g., 7 + 3; subtract one number from two numbers (no borrowing required) e.g., 19-7, etc. In the area of reading, students may be required to say what sounds they hear in spoken words; put individual sounds

into words e.g., d-o-g = dog; sound individual letters; read phonetically simple two- and three-letter words, etc. Each area of the curriculum must be analyzed to determine what tasks students are required to perform. This analysis must be conducted on the curricula used in both regular education and in special education.

4. For each task identified during the inventory:
   a. record the *task label*: e.g., "feed the chickens";
   b. list the major steps in the task *if you are certain the steps/sequence would not be commonly known;*
   c. record the number of environments and subenvironments in which the task is performed;
   d. record how often each task is performed;
   e. describe any *special* equipment, materials, conditions, adaptations or methods used;
   f. describe any help provided by another person;
   g. describe any special care that must be taken during performance of the task;
   h. describe any related COMMUNICATIONS that are made during the task;
   i. describe any related SOCIAL behaviors that occur during the task;
   j. identify behavioral problems to reduce, (e.g., blindisms, such as eye-poking);
   k. indicate if the behavior is required currently [C], or in 1, 2, 3, or 5 years; and
   l. if the behavior has been predicted as a future need, indicate how important it will be to learn the skill (high [H], medium [M], or low [L]).

When reading these instructions and those that follow, remember that the purpose of the discussion is to describe procedures that could be adopted under *ideal* conditions. Actual use of the approach may be considerably simplified. Suggestions for simplification are described later. Following the ecological inventory of the NONhandicapped person, an inventory is performed of the person with the handicap.

1. Identify all *current subenvironments* in which the person with the handicap performs but the NONhandicapped person does not (e.g., a specialized treatment centre). List all tasks the person with the handicap performs *in*adequately in each of these subenvironments.
2. In each environment, identify all *future subenvironments* in which the person with a handicap may perform but the NONhandicapped person will not (e.g., a sheltered employment workshop). List the

tasks the person with the handicap will be required to perform in each of these subenvironments.

3. List any *unique tasks* the person with a handicap will be required to perform in any current and/or future environments as a result of the nature of his/her handicap (e.g., maintenance of a hearing aid; put on and adjust leg braces or calipers).
4. For each task:
   a. record the *task label* (e.g., buying fish in the market);
   b. list the *major* steps in the task if *you are certain* the steps/sequence would not be commonly known (e.g., locate stall selling type of fish desired; judge quality of the fish; confirm price per kilogram; go to different stall if quality or price unsuitable; request amount desired; confirm amount received; pay for fish);
   c. record the number of environments and subenvironment in which the task is performed (one [1], several [S] or most [M]);
   d. record the frequency with which the task is performed (hourly [H]; daily [D]; weekly [W]; monthly [M] or yearly [Y]);
   e. describe any *special* equipment, materials, conditions, adaptations or methods used;
   f. describe any assistance provided by another person (e.g., mother tells what type of fish to buy, approximately how much a kilogram will cost, and the total cost of the purchase; sufficient money is given);
   g. describe any special care that must be taken during the task (e.g., avoid buying wrong type, decaying or damaged fish);
   h. describe any related COMMUNICATIONS that are made during the task (confirm type, amount and cost of fish requested by mother; greet fish vendor; ask for price per kilogram; ask for amount desired; ask for change if wrong amount measured; thank vendor);
   i. describe any related SOCIAL tasks that occur during the task (e.g., wait for turn at the fish stall);
   j. identify behavioral problems to reduce, (e.g., blindisms, such as eye-poking);
   k. indicate if the behavior is required currently [C], or in 1, 2, 3, or 5 years; and
   l. if the behavior has been predicted as a future need, indicate how important it will be to learn the skill (high [H], medium [M], low [L]).

Examples of various tasks in different environments and subenvironments. Note, only a limited number and type of tasks for each environment and subenvironment are listed. The letter following each task indicates if the task is performed hourly [H], daily [D], weekly [W], monthly [M] or year-

ly [Y]. Note, that **some** examples of communication, and social tasks are listed. Several unique skills required of persons with blindness are also listed.

Home environment

Kitchen subenvironment

a. Use charcoal, wood or dung in a fire [D].
b. Wash, peel and cut vegetables and fruit [D].
c. Measure, wash and cook rice, lentils and corn [D].
d. Use a mortar and pestle to prepare spices [D].
e. Clean fish [W].
f. Store food and water [D].

Associated communication and social tasks:

a. greet other person(s) working within cooking area;
b. request use of materials/equipment being used by someone else;
c. locate a separate work-space not overlapping with the other person's work area;
d. if required, request information about methods/materials; and
e. introduce, or join and maintain conversation about common topics such as: the harvest, weather, etc.

Toilet subenvironment

a. Toileting [D].
b. Clean teeth [D].
c. Wash body [D].
d. Wash and comb hair [D].
e. Care for menstrual needs [M].
f. Shave [W].
g. Care for infections, bites and cuts [M].
h. Wash the toilet area [W].
i. Put antiseptics around toilet area [W].

Associated communication and social tasks:

a. Do not approach the toilet area when being used by members of the opposite sex.
b. If other people are waiting to use the toilet area, wait for your turn.
c. Greet other people in the area.
d. Close the door before using toilet area.
e. Introduce, or join and maintain conversation about common topics such as: the harvest, weather, etc.
f. Etc.

Community environment tasks

Market subenvironment

a. Locate market stalls for fruits, vegetables, grains and meats [D].
b. Select the correct food item (e.g., select a specific type of vegetable) [D].
c. Select mature, undamaged food [D].
d. Agree on the price [D].
e. Pay for the food [D].

Unique skills required of persons with blindness

a. Walk through the market using a cane.
b. Find particular vendors on the basis of the number of footsteps from a fixed location.
c. Ask the vendor to put your hand on the fruit or vegetables desired.
d. Discriminate ripe, undamaged and fresh produce by touch, etc.

Temple, church or mosque subenvironments

a. Prepare for entry into a holy place [D].
b. Pray [D].
c. Attend weddings, funerals and other special ceremonies [M].

Vocational environment tasks

Animal shed subenvironment

a. Put animals in the shelter [D].
b. Sweep the cattle shed [D].
c. Carry cow dung to the manure heap [D].
d. Collect fodder for the cows and buffaloes [D].
e. Milk the cows and goats [D].
f. Care for cuts, scrapes and infections [W].

Crop land subenvironment

a. Plow and cultivate the field [Y].
b. Spread fertilizer [Y].
c. Plant seeds [Y].
d. Build and maintain irrigation ditches [Y].
e. Water the crops [D].
f. Remove weeds [W].
g. Pick and store the crop [Y].
h. Graze goats and sheep [D].
i. Collect firewood [D].

Blacksmith's workshop subenvironment.

a. Collect firewood and coal [D].
b. Light a fire [D].
c. Add firewood and coal to the fire, as required [H].
d. Use tongs to insert and remove iron from the fire [H].
e. Judge the heat of iron in the fire [H].
f. Use a hammer and anvil to shape a piece of hot iron in the desired manner [H].

5. Following the identification of the variety of tasks that may occur in each environment/subenvironment, the relative importance of each task is estimated using the Task Importance Rating Scale described below. Tasks that are rated as relatively unimportant are eliminated. The remaining tasks are organized into a *catalogue* according to the environment(s) and subenvironment(s) in which they are performed. The relative importance of each task (e.g., low, medium, high) is shown in the catalogue.

Task Importance Rating Scale

The importance of each task may be judged by its likely contribution to:	none	low	medium	high
a. learning functional skills	-	-	-	-
b. increasing social acceptability	-	-	-	-
c. learning chronological-age appropriate skills	-	-	-	-
d. increasing opportunity to learn additional skills	-	-	-	-
e. learning survival skills	-	-	-	-
f. improving performance in a variety of environments	-	-	-	-
g. increasing opportunities to interact with nonhandicapped people	-	-	-	-
h. increasing ability to fulfill frequent opportunities to perform	-	-	-	-
i. increasing ability to perform in less restrictive environments	-	-	-	-
j. improving health	-	-	-	-
k. improving safety	-	-	-	-
l. increasing opportunities to understand/express thoughts, and feelings	-	-	-	-
m. increasing opportunities to enjoy social-emotional-recreation life	-	-	-	-

To use the Task Rating Scale, it is often useful to form a small *committee* of people familiar with teaching and with the type of persons in the target group. Initially, each committee member should independently rate the relative importance of each task to people in the target group. Each committee member, with experience, can quickly mentally review each item in the scale and give an overall rating of low, medium or high importance in relation to other tasks the student may be required to learn. When large differences in the rating given by committee members to a particular task occur, members of the committee may review and discuss each of the rating items in detail.

Listing tasks in a catalogue. Tasks may be listed in the catalogue as task labels, as instructional objectives and/or as subskills of instructional objectives. Instructional objectives provide a clear description of tasks. However, instructional objectives require considerable time and skill to write. In the early stages of writing or modifying curricula, task labels may be used temporarily. Several methods of describing tasks are discussed below.

Listing task labels in a catalogue. The following tasks are listed in a catalogue as task labels. This *checklist* of labels describes some of the tasks commonly performed in a rural, kitchen subenvironment. The checklist can be used as a curriculum guide describing the tasks students should be taught to perform. The checklist can also be used as an assessment record. Following testing, a checkmark is recorded after each task the student was able to perform acceptably.

a. Uses charcoal, wood or dung in a fire ___.
b. Washes, peels and cuts vegetables and fruit ___.
c. Measures, washes and cooks rice and lentils ___.
d. Uses a mortar and pestle to prepare spices ___.
e. Cleans fish ___.
f. Stores food and water ___.
g. Uses insecticides to control common household insects ___.

Listing task labels in a checklist is the simplest method of developing a curriculum. Where time, money and/or expertise are limited, this may be an acceptable, *temporary* method for listing tasks. Note, however, that a list of task labels of this sort is the least useful type of curriculum. As discussed below, none of the tasks is described in sufficient detail. At the first opportunity, the description of tasks in the curriculum should be improved. Checklists are also discussed in Chapter Ten.

Listing instructional objectives in a catalogue. In the task label shown below, insufficient information is provided about the *conditions* surrounding the task.

Task label: "Uses charcoal, wood or dung in a fire."

For instance, is there an existing fire into which the student puts charcoal, wood or dung? Is it necessary to light the fire? Is there paper, or

small pieces of wood to start the fire? Are matches available or will the student have to get coals from another fire? What type of stove is being used? Because the *conditions* (equipment, materials, adaptations, etc.) are not adequately described in the task label, various teachers may teach their students very different tasks. Ideally, an objective should list the *most difficult, commonly found conditions* and *the most common range of conditions.* This information can be gained during the ecological inventory. In the example that follows, the conditions are more clearly described.

Task label with description of CONDITIONS:

GIVEN: paper and dried dung, mixed with straw, and matches *or* a nearby fire from which to get coals, the student will light a fire in a common kitchen clay oven or on open ground.

This task is described with sufficient detail so that teachers can train their students to perform under the most difficult commonly found conditions and the most common range of conditions found in a particular village. To teach a student to perform under conditions that are simpler than those described, (a common practice in special education) or that are different from those described, would result in a failure to train the student adequately for common conditions in his/her environment. Although this task description is an improvement over the task label, no *minimum, essential, standards of performance* are described. The standards describe how to judge the adequacy of the student's performance. Without standards, teachers may not know when students have learned the essential skills. Standards should describe, for example, how large or hot a fire should be built; how long the fire should burn; safety precautions the student must take, etc.

Instructional objective with CONDITIONS and STANDARDS:

GIVEN: paper and dried dung mixed with straw and matches *or* a nearby fire from which to get coals, the student will light a fire in a common kitchen clay oven or on open ground. The student will be given two trials only to light each fire. STANDARDS: the student should remove all flammable material from around the fire; if windy, a windscreen should be built next to the fire; the fire should be of sufficient size, heat and duration to cook two litres of rice.

The standards are used to judge the student's *performance.* To be judged, the performance must be *observable.* The performance in the previous objective is *"light* a fire." Each step in *"lighting* a fire" is observable. For example, to light a fire, a person "collects" and "piles" paper and dried dung, "builds" a windscreen, "lights" a match, "burns" the paper, and "adds" more wood or dung, as required. The performance in an objective is described by a *verb*, e.g., to collect, pile, light, etc. Not all verbs describe observable acts. For example, the verbs "to know," "to understand," "to recall" or "to recognize" do not describe observable acts. Verbs

like these describe *invisible mental, perceptual and sensory acts* that occur inside a person's head. A teacher will not know if a student "recognizes" an object unless the students performs an observable act such as "points to," "sorts" or "labels" the object. The verb "recognizes" does not tell the teacher what student behaviors to teach or test. As a result one teacher may teach and test students "to point to" objects to show recognition. Another teacher may teach students "to sort" objects. A third teacher may teach the students "to point to, sort and label" the objects. Because the verb "recognizes" does not tell teachers exactly what observable acts to teach and test, the verb is subject to interpretation. Each of the three teachers may teach and test quite different skills. Thus, when writing an objective, translate verbs like "recognize," that refer to invisible acts, into verbs that describe observable acts. The verbs should be carefully selected to describe essential, functional behaviors you want students to learn. For example, students may be taught to show that they "recognize" poisonous snake bites by "pointing to or labelling" poisonous bites. However, it would be more functional to teach them to "treat" the bites by "tying" a belt above the bite, "cutting" the bite to promote bleeding, etc.

Instructional objectives may be further improved with use. The conditions, performance and standards may be added to, subtracted from, or otherwise modified. The advantages of describing tasks in the form of instructional objectives are obvious. A curriculum written as a list of instructional objectives is referred to as a *competency-based curriculum.* A curriculum of this nature may also be used as a *criterion referenced test,* discussed in Chapter Ten. The disadvantages of instructional objectives are also apparent. It takes considerable time and expertise to write good instructional objectives. Luswata (1986) provides an introduction to instructional (behavioral objectives) in the *Special Education Bulletin for Eastern and Southern Africa.* Mager's (1962) book is a classic on the topic.

In many situations, the most practical approach to curriculum development would be simply to list a series of task labels. Selected tasks could be described in the form of instructional objectives. Since there is a tendency to leave curricula as they are once they have been developed, plans should be made to review the curriculum repeatedly and systematically. As many of the tasks as possible should be written in the form of instructional objectives. Also, the description of conditions, performance and standards should be improved, as required.

As was mentioned earlier, the tasks listed in a curriculum may be *task analyzed* to determine the skills students must be taught to enable them to perform the particular task. A task analysis may be done by a) studying the steps other people take to perform a task, b) thinking about each of the steps required to perform a familiar task, and/or c) actually performing the task. It is best to study the manner in which several competent people perform a task to find the simplest way to perform the task. Also, by studying the way people who are having difficulty perform a task, a teacher can identify problems to avoid during teaching (Baine, 1982).

Listing instructional objectives and their subskills in a catalogue. In the example that follows (Baine, 1986a), an objective and the subskills required to perform that objective are listed in a catalogue.

> Objective: *Given*: five examples of each of the following types of three letter words: "ate," "cat, "the" and "toy," where the same words have not been included in previous reading instruction, the student will *read* each word. *Standards*: the student may sound-out each letter before blending sounds into the final word; the final word form must be read aloud in less than 6 seconds; in the final word form, appropriate sounds must be given to all letters, silent letters must not be sounded (e.g., "e" in "ate"); four errors may be committed providing the same type of error does not occur more than once.
>
> The task described in this instructional objective was task analyzed to identify the following skills students would be required to learn to perform the task described in the objective.
>
> Skills: the student will be able to:
>
> a. make short vowel sounds (e.g., "a" in "cat") when given randomly any printed vowel (a, e, i, o and u);
> b. make long vowel sounds (e.g., "a" in "ate") when given randomly any printed vowel (a, e, i, o and u);
> c. make consonant sounds when given randomly any printed consonant (e.g., b, c, d, f ...) in the alphabet, and
> d. blend the individual letter sounds together when given randomly any two or three letter combinations while:
> - using short vowel sounds;
> - using long vowel sounds;
> - changing consonants to digraphs (e.g., rather than pronounce "t" and "h" as separate sounds, read as one sound as in "the");
> - change vowels to diphthongs (e.g., rather than read "o" and "y" as separate sounds, read as one sound as in "toy"),
> - not reading silent letters, and
> - try different combinations of these variations until a familiar word is identified.

This list of subskills in a curriculum tells a teacher exactly what skills students must be taught if they are to learn to perform the task described in the instructional objective. Ideally, tasks in a curriculum should be task analyzed before the curriculum is given to teachers if it is likely that the teachers will not have sufficient time and/or skill to task analyze the tasks. Because of the skills, time and costs required to do a task analysis, frequently it may not be possible to list skills in initial curricula. However, because of the obvious benefits, task analyses should be performed on the skills listed in a curriculum at the earliest opportunity. Perhaps curricula, could be developed in several phases. Initially, a limited number of selected tasks could be task analyzed as examples. Teachers could be

trained in methods of task analysis. Teams of teachers, having skill in particular areas of a curriculum, could task analyze selected tasks. The results of their task analyses could be shared with those of teachers who have analyzed other areas of the curriculum.

Abbreviated Inventory Guide

This guide may be used during an actual ecological inventory.

1. Identify the nature of the target group.
2. Select for study a wide variety of families to represent the various characteristics of the target group.
3. Prepare informants (parents, teachers, employers, etc.) for the inventory. Distribute diaries and reminders and/or provide advance talks to groups of informants.

Conduct an ecological inventory of the NONhandicapped sibling first

4. Select one *environment* for inventory; order: home, community, vocational, and school.
5. Identify an informant: mother, teacher, employer, etc. for each environment.
6. Interview the informant to identify all *tasks* performed in each subenvironment. Ask the following questions.
   a. What routine, daily tasks are performed in morning, afternoon, and/or evening in each subenvironment?
   b. What communication, recreation and social tasks are performed in each subenvironment?
   c. What seasonal tasks occur?
   d. What tasks are performed during common, special events: religious holidays or ceremonies, birthday celebrations, etc.?
   e. What tasks are performed during uncommon events of high importance, e.g., religious ceremony, fire, monsoon flooding, etc.?
   f. In which new environments/subenvironments will the person being inventoried be required to perform in 1, 2, 3, 4 and 5 years?
   g. What daily, seasonal, emergency, special event, communication, recreation and social tasks will the person being inventoried be expected to perform in these future environments?
   Future prediction is based on interview of educational, health, social services, agricultural and industrial experts; and/or review inventories of older persons.
   h. How often is each task performed (hourly [H]; daily [D]; weekly [W]; monthly [M]; yearly [Y])?
   i. Is the task performed in one [1], several [S], or most [M] environments?

j. Record any *special* equipment, materials, conditions, adaptations or methods that are used.

k. Who uses tools or equipment found in the subenvironment that have not previously been discussed?

l. What are these tools used for? Will the person being inventoried be expected to learn to use these tools in the next 5 years? When?

m. If any tasks are apparent that have not been discussed, ask the informant who performs these tasks and if and when the person being inventoried will be expected to learn to perform these tasks in the next 5 years.

n. Interview the NONhandicapped person to determine where in the community she or he goes and what she or he does.

o. Make observations in selected community subenvironment of a random selection of people of the same sex and similar age as the person under study.

p. Have the NONhandicapped person demonstrate performance of selected tasks.

q. Analyze each area of the regular curriculum to determine what tasks students are/will be required to perform.

Conduct the inventory of the person with the handicap

7. Identify all *current* environments/subenvironments in which the person with a handicap performs but the NONhandicapped person does not (e.g., a specialized treatment centre).
8. List all tasks the person with the handicap performs *in*adequately in each of these subenvironments. It may be desirable to have the person with the handicap perform selected tasks.
9. Identify all *future* environments/subenvironments in which the person with a handicap may perform but the NONhandicapped person will not.
10. List the tasks the person with a handicap will be required to perform in each of these subenvironments.
11. List all unique or compensatory tasks the person with a handicap will have to perform in current and future environments as a result of the nature of the handicap.
12. Analyze each area of the current/future special education curriculum to determine what tasks students are required to perform.
13. For each task identified in the inventory of the NONhandicapped person and the person with the handicap, record the following information on the Ecological Inventory Recording Sheet.
    a. Record the *task label.*
    b. List the *major* steps in the task if *you are certain* the steps/sequence are not commonly known.

c. Record the number of environments and subenvironment in which the task is performed (one [1], several [S] or most [M]).
d. Record how often each task is performed (hourly [H]; daily [D]; weekly [W]; monthly [M] or yearly [Y]).
e. Describe any *special* equipment, materials, conditions, adaptations or methods used.
f. Describe any assistance provided by other people.
g. Describe any special care that must be taken during performance of the task.
h. Describe any related COMMUNICATIONS that are made during the task.
i. Describe any related SOCIAL acts that takes place during the task.
j. Identify behavioral problems to reduce, (e.g., blindisms, such as, eye-poking).
k. Indicate if the task is required currently [C], or in 1, 2, 3 or 5 years.
l. If the task has been predicted as a future need, indicate how important it will be to learn the task (high [H], medium [M], low [L]).

Suggestions for Adopting an Ecological Inventory Approach to Curriculum Development

The suggestions that follow describe increasingly more extensive changes. The ability to adopt the more extensive changes depends upon the availability of sufficient time and skill.

1. Keep and review curricula currently in use. Identify and replace nonfunctional, generic, readiness and preacademic tasks with functional tasks. See Chapter Two for a discussion of these issues.
2. Do a *conceptual ecological inventory*. Several teachers can work together to make a list of the functional tasks they *think* are/will be required in the home, community, vocational and school environments. The relative importance of these tasks can be evaluated using the Task Importance Rating Scale. More important skills can be put into the curriculum.
3. Perform a small, trial ecological inventory. Teachers, in teams of two, may select a small number of "typical" homes in which to conduct inventories of one or two subenvironments. These trial inventories will help to improve getting, recording and using inventory information.
4. Review the previously described inventory methods and identify the procedures that can be readily adopted and those that will require additional, time, expense and experience. Initial inventories may seek a limited amount and type of information. This information should be used in improving curricula. As methods of getting, recording and

using information improve, increasingly more information can be sought.

5. Different groups of teachers in other classrooms, schools or communities can do ecological inventories on different subenvironments and share the results with other teachers.
6. Review and revise the *academic curriculum.* Academic skills should be taught if they are a part of functional tasks students are or will be required to perform now or in future. Academic skills should be taught in the same form in which they must be performed in the functional tasks. The functional tasks and the related academic skills should be taught at the same time. Academic skills that are not a part of functional tasks should not be taught unless they are prerequisite to higher levels of education that the student is capable of achieving. Review and revise the academic curriculum in the following manner.
   a. Use an ecological inventory to identify the functional tasks students will be required to perform now and in future in their various environments and subenvironments.
   b. Perform task analyses on these tasks to identify the skills students must learn to be able to perform the tasks.
   c. Review the academic curriculum and identify where, when and how these skills are taught. If necessary change the teaching methods so that the skills are taught in the same form as they must be performed in the functional task. If necessary, change the curriculum so that the functional task is taught at the same time as the related academic skills. If skills that are a part of functional tasks are not taught, add these skills to the curriculum. Identify skills taught in the curriculum that are not a part of functional tasks and that are not prerequisite to higher levels of education that the student is capable of achieving. Eliminate these skills from the curriculum.

Developing Curricula for Individual Students

The catalogue of tasks developed by the ecological inventory method lists common, daily, functional tasks nonhandicapped persons and handicapped persons, in particular environments, are or will be required to perform now or in the future. It is unlikely that any one student will be required to perform all of these tasks. To design a curriculum for a particular student, tasks, functional for that student, are selected from the catalogue. The number and type of tasks selected may be determined by the student's age, sex, type and degree of handicap, current and future environments and current abilities as determined by testing. Testing is discussed in Chapters Nine and Ten.

Example programs for three students are shown below (Baine, 1986a). Note that the curriculum for each student is organized by environments. This organization emphasizes the functional nature of each task. The

amount of emphasis in each area of instruction is shown. In the example, all three students are ten years of age. Student 1 is blind and capable in the next year of passing to the next level of academic study. His long-term goal is to enter university. His program is mostly academic. He is also being taught a number of functional skills relating to the general community. A few skills, functional in the home, are also being taught.

	Student		
Area of curriculum	*1*	*2*	*3*
School	high	low	low
Vocational	none	low	high
Community	medium	high	medium
Home	low	high	low

Student 2 has a moderate degree of retardation. She has not learned many academic skills and will not likely learn many more. Her long-term goals are for sheltered employment and independence in the community and home. She will likely have considerable time for recreation. There are many functional skills in the community and the home that she needs but does not have. Her program focuses on teaching functional and recreational skills for the community and home environments. As she gets a little older, the amount of emphasis in the vocational area will be increased (she may be taught to perform very specific vocational skills, under supervision).

Student 3 has a physical handicap and a mild degree of mental retardation. He is not strong in academic areas of performance and will likely not achieve a high academic level. He is capable of learning some additional practical academic skills to assist him in other areas of his life. With suitable training he will likely be able to gain independent employment. His program is starting to focus on training vocational skills. He is also being taught a number of functional community skills. The programs for each of these students should be reviewed each year and the relative amount of emphasis in each area of instruction should be adjusted as required.

Notes

1. *Norm-referenced curricula.* In the past, children with mental handicaps have usually been taught skills at their mental age level. For example, a nine year old student functioning at the three year old *mental age* level might have been taught skills like stacking blocks, completing simple picture puzzles, and stringing beads. These skills, discussed in Chapter Two, are not only nonfunctional—not required in the student's life, but also they may retard the student's development. When teaching focuses on a student's mental age level, when the student learns at a slower than average rate, she or he will not only remain behind the development of normal functioning students of

the same *chronological age*, but also will fall further and further behind in development. Brown (1979), working with adolescent students having severe mental retardation, demonstrated that rather than slow development in this manner, it is possible to teach *chronological, age-appropriate and functional skills*. In terms of mental age, Brown's students might have been taught tasks like matching block designs, and matching colored squares. Instead they were taught age-appropriate, functional skills like food preparation, telephone use, shopping, bus riding, and vocational skills. In the new approach to education, because the teaching of severely handicapped people has shifted from a focus on the students' mental age to their chronological age, many people with severe mental retardation, previously locked in institutions, are now living and working in the general community (Baine, 1986a). Now, when working with a nine year old student, functioning at the three year old level, rather than teach the skills at the three year old level, a teacher would teach the student age-appropriate (nine year old), functional skills—skills required in the student's environment. In some cases, the student may have to be given a *prosthetic device* to assist him/her to perform age-appropriate tasks. (A prosthetic device [e.g., braille, braces/calipers, special spoon, etc.] improves or makes possible an act a handicapped person would otherwise not be able to perform). In some situations, the student may be capable only of *partial participation* of the task—someone else will have to perform some parts of the task. In any case, the student's opportunity to learn age-appropriate, functional skills and to reduce dependency is optimized. This approach is consistent with the *principle of normalization* in which skills are taught that help students lead lives as close as possible to the lives of nonhandicapped people.

2. *Terminology.* Although there are *recreational* environments, recreation may take place in most environments. Therefore, contrary to Brown et al. (1979), recreation in this text is referred to as a *task* rather than as an environment. Other tasks found in most environments are *communication* and *social*. Since vocational tasks usually take place in a vocational environment, in this text, as in Brown, vocational refers to an environment. Thus, in this text, the ecological inventory is conducted to identify common daily *tasks*, as well as recreational, academic, communication and social *tasks* in the home, community and vocational *environments*.
3. *Prediction of future needs.* If it takes three years for a student to learn to perform a particular skill, and if that skill is important to the individual, then instruction of the skill should begin three years before the skill is actually required. If training does not begin early, the student will not learn to perform the skill until three years after it is first required. If a student is only taught skills currently required, and if the student is slow to learn the skills required, he will never be

be able to perform adequately in his current environments. Thus, students should be trained at the same time to perform skills required in both their current and future environments. The rate at which a student learns determines how much, in advance, future needs should be taught. The relative importance of a skill determines whether or not it should be trained in advance. The relative importance of a skill can be determined through use of the Task Importance Rating Scale.

The importance of predicting the immediate and long range needs of individuals, their families and the community was described in the recommendations listed at the end of Chapter Two. Curricula should be future oriented (IIEP, 1977) so that students are not taught skills that may not be profitable in the future (Chege, 1984). *Vocational training* should be offered in occupations that will be needed in the future (Moriyama, 1982). Ideally, vocational training should begin at the pre-primary level and continue until vocational ability is attained (Csapo, 1987).

Thus, it is important to attempt to predict what skills will be required 3 to 5 years in advance. Often, it is sufficient to predict an individual's needs one year in advance, except where major environmental changes are expected such as movement from rural to urban areas, or where a large number of skills are required and/or where the skills required may take a long time to learn. Future predictions may be made through interviews of parents in terms of the changes they plan or expect to influence their children. Inventories conducted on persons 1-5 years older may provide insight into future skill needs. In addition, members of the village council, as well as representatives of educational, health, social services, agriculture and industry, etc. should be interviewed regarding current trends that may influence the future. Some of the influences affecting the future of rural communities are listed below.

a. The introduction and expansion of radio and television in rural communities may increase the influence of urban and Western values and lifestyles.

b. Increasing industrialization has reduced the need for craftsmen. For example, the availability of attractive and long wearing synthetic fabrics, and inexpensive, massed produced, long wearing aluminum, stainless steel and plastic pots have reduced the need for weavers and potters.

c. Various forces influence the migration from rural to urban areas where radically different skills are required.

d. Increased technology (high yield crops, fertilizers, insecticides, mechanization) and the shift from subsistence to cash crop farming vastly changes the number and types of jobs and skills required.

It is obvious from the foregoing discussion that curricula should teach at the same time skills required in a person's current and predicted, future environments. The task of the curriculum developer at this point is to:

a. attempt to make a valid prediction of future needs;
b. rate the likelihood that each prediction will actually occur (avoid focussing on unlikely events);
c. rate the relative importance of each of the future needs (use the Task Importance Rating Scale);
d. determine when the skill will be required (1, 2, 3, 4 or 5 years);
e. in terms of an individual student, decide on an appropriate amount of focus on current and future needs.

4. *Limitations of interview information.* Information gained by interviews may be limited in several ways. Some of these limitations are described below.

   a. The amount, type and validity of information obtained in an interview is greatly influenced by the skills and characteristics of the interviewer. Inadequately trained interviewers may get little information of value and may often get invalid information.
   b. Informants may have misinformation, may not have the information requested, may invent information rather than say they do not know, and may not have the language skills to describe the information they do have.
   c. The information the informant gives may be inconsistent and the terminology used may be interpreted differently by the interviewer and the informant. For example, one mother when asked "Who cooks the meals?" replied, "I cook all the meals." The interviewer might have concluded following this answer that none of the three children in the family cooked any of the meals. The interviewer may also have interpreted the answer to mean that the mother participated in the cooking of all meals. Further questioning indicated that the nonhandicapped son cooked breakfasts, that the nonhandicapped daughter cooked dinners, and that the son with mental retardation cooked no meals. Additional questioning indicated that none of the children independently cooked any meals; that the normal son and daughter actually cooked portions of all meals, and that the son with mental retardation did not cook anything although he did help considerably in the preparation of food that was cooked in all meals.

      In this example, it is apparent that the mother was not using the word "cook" consistently and that the interviewer and the mother may have had different interpretations of the meaning of the word. Sometimes a skilled interviewer will ask several related

questions to verify the answers given. It may also be necessary to observe some tasks actually being performed.

5. *Examples of communication, recreation and social tasks.* Communication: during the analysis of all tasks, whether common daily chores, vocational, recreational, social and academic, important communication acts such as greetings, requests, conversations, etc. should be identified. These communication acts should be taught at the same time as the tasks to which they are related are taught. Particularly for young or low functioning children, language should be taught where and when it is to be be used. Teaching should occur at home and in the classroom within the daily activities where language is functional.

   Some examples of the communicative functions of language are described below. These categories have been adapted from Dore (1977, 1978), Miller (1981) and Roth and Spekman (1984).

   a. *Requesting information, action or cessation of action*: requesting information, clarification, permission, confirmation or repetition; for example: "*Who* is next?" "How much do the mangoes cost per kilogram?" "*Where* is the fish vendor?" "*What* time should I come?" "Should I open the floodgate now?" "Would you please show me again, how to light the kerosene lamp." "Please mill this grain." Saying, "Stop," when enough rice has been poured onto a scale.

   b. *Responding to requests*: supply *requested* information or acknowledge preceding message; for example: says, "Yes" or "No," following the question "Is this enough rice?" Answers, "This mango here and those two over there" when asked "Which ones do you want?" "The fish vendor is over there."

   c. *Stating or commenting*: state facts or rules, express beliefs, attitudes or emotions, or describe the environment; for example: "These plantains are ripe." "Put the lid on the reservoir before lighting the kerosene lamp." "I think it is too expensive." "I am afraid of snakes." "I think it is going to rain."

   d. *Regulating conversational behavior*: recognize answers and requests; indicate understanding or agreement or disagreement; greets, opens or closes discussion; solicits attention: for example: "Yes." "No." "I disagree." "Salaam." "Namiskar." "Hello." "Good-Bye." "John!"

   e. *Descriptions of verifiable past or present facts*: labels objects or events; describes events, actions, processes, properties or conditions; describes locations, directions or times; for example: "This is a bullock." "I am waiting for the water to boil." "The sheep are near the river." "He left here last night."

f. *Performatives*: protests: registers complaints about the listener's behavior; claims established rights; gives a warning; for example: "Stop." "I'm first." "Watch out."

Some examples of social behaviors are listed below. Many of these behaviors are so common they may be considered minor and unimportant. To an observer, however, the absence or incorrect performance of these behaviors is often the first clue that a person being observed may be handicapped. Often, because of poorly developed social behaviors, handicapped people are not given the opportunity to demonstrate other skills they have learned.

Shaking hands with another person as a form of greeting is socially appropriate in some cultures but not in others. There are large differences between the behaviors considered socially appropriate in various cultures. Care must be taken to identify the behaviors considered to be socially appropriate or inappropriate in particular cultures. Jackson, Jackson and Monroe (1983) have developed a program for teaching social behaviors to children living in North America, *Getting along with others: Teaching social effectiveness to children*. A similar program, *Social skills training manual* has been developed by Wilkinson and Canter (1982). Some examples of social behaviors are listed below.

a. *Greeting behaviors*: for example: shaking hands; bowing; smiling; bringing hands or palms together towards one's face; kissing a person on both cheeks; hugging; saying: "Namiskar," "Salaam," "Hello," or "Hi." In some cultures, touching people during greeting is considered to be very unacceptable; in other cultures, touching people while greeting them is expected.

b. *Social behavior during conversation*: standing or sitting an appropriate distance from other people; eye-contact (in some cultures it is appropriate to look into the eyes of other people during discussion—in other cultures this behavior is unacceptable); smiling and nodding; speaking for a reasonable period of time; taking turns speaking; responding to what the other person said (e.g., agreeing or disagreeing; asking for additional information; extending discussion of the same topic); and not interrupting a speaker.

c. *General social behaviors:* holding hands (in some cultures males may hold the hand of other males—but not the hands of females) in other cultures physical contact between members of the same sex is not generally acceptable); saying "Please" or "Thank you" when requesting or receiving something; standing when a person of higher status comes into a room or during introduction, and letting people of higher status or honor enter a doorway first.

An interesting book, *Thai values and behavior patterns* (Mole, 1973), describes some of the behaviors considered appropriate/ inappropriate in Thailand.

It is considered *inappropriate*: to elevate one's feet to a prominent level during discussion; to point at someone; to cross one's legs while seated with an older or superior person; to point with one's feet; to touch a Thai woman's arm or hand when greeting; to cross legs while seated in a temple; to touch another person before having received consent of that person; to sit at a level higher than that of persons of high status or honor, e.g., grandmother or grandfather; to sit with the soles of one's feet facing toward another person; and to ask personal questions.

It is considered *appropriate*: to remove one's shoes and hat before entering a place of worship; to wear somber colors or white during solemn occasions; to remove shoes before entering a Thai home, and to step over rather than on the threshold beam at the entrance of a temple.

Some examples of *recreational tasks* are described below. Recreational tasks are chosen for enjoyment or pleasure when one is not required to work or fulfill other responsibilities. There are a variety of different types of recreational tasks: physical, cultural, social and mental at home, school and in the community. One may be involved as an observer (watching a cricket match) or as a participant (playing in a cricket match).

a. Sports/fitness (individual or group/team): walking, jogging, hiking, swimming, kickball, soccer, cycling, cricket, throwing and catching a ball.
b. Hobbies: collecting foreign coins, weaving and pottery.
c. Games: hide-and-find, chess, sailing paper boats down a monsoon flooded path, rolling a bamboo hoop, playing with string (cat's cradle), wire sculpture, flying kites, playing bamboo flutes and spinning a top.
d. Cultural: dancing, singing, making or listening to music, dramatics; watching snake performers, acrobats and puppeteers; and listening to story tellers.
e. Miscellaneous: trapping crayfish in a stream; tracking animals, catching insects (dragonflies and beetles).

Chapter Four

Teaching Methods: One

The goals of this chapter are as follows.

a. Demonstrate how to write instructional objectives. Examples of several types of objectives are provided.
b. Demonstrate how to use a performance analysis to identify the steps required to perform the tasks described in behavioral objectives. The results of several performance analyses are provided.
c. Describe various methods of using prompting and fading to teach motor behaviors and discriminations.
d. Discuss various methods of teaching chains of behaviors.
e. Review various types of rewards used to increase desirable student behaviors.
f. Demonstrate how to use rewards to teach chains.
g. Describe various methods of using shaping.

Instructional Objectives

Instructional objectives were first discussed in Chapter Three. Objectives are used as a method of describing tasks in curricula. Objectives are also used to describe the tasks in tests. Testing is discussed in Chapters Nine and Ten. Objectives are a very important parts of both testing and teaching. An example of an instructional objective follows.

Given: *Conditions:* a fish, a knife with a blade 8-25cm long, and a supply of water, the student will
Performance: clean the scales from the fish to the following
Standards: 95% of the scales must be removed from the head and body;
scraping should not cut through the skin of the fish;
the student must not scrape the knife toward himself;
the student must not cut or scrape himself.

During an ecological inventory, a functional task is identified. Information about the task is obtained from parents, teachers and/or employers. Various persons may be observed performing the task. Information may also be gained about: various methods of performing each task, common performance problems, and the equipment and materials used. All of this information can be written into an instructional objective to provide an accurate description of the task. Instructional objectives (also called *behavior objectives*) have three parts.

a. *Conditions*: the physical conditions (e.g., equipment, and materials) and/or social conditions (e.g., people and events) surrounding performance of the task. An objective should describe the most difficult, commonly found conditions, and the most common range of conditions *that may influence performance of a task.*

b. *Performance*: a verb or verbal phrase describing observable behavior a person will perform under the conditions described in the objective.

The following behaviors are *not* observable. These behaviors are *covert*, take place in a student's head—cannot be seen directly. Verbs of this type should *not* be used in objectives.

"discriminates, knows, understands, recalls, recognizes, identifies, etc."

The following behaviors are observable. Behaviors of this type *can be used* in objectives. The student's behavior can be directly seen or heard.

Touch the big pot. *Say*, "Yes." *Read* (aloud) the word "rice." *Put* the rice in the pot. *Measure* the water.

c. *Standards*: the minimum, essential standards a student's *performance* must achieve under the *conditions* described in the objective. The standards may describe the percentage of correct responses required; the number and type of errors permitted, time limits before completion of the behavior, and the rate of performance, etc.

The art of writing objectives lies in providing the right amount and type of information—neither too much nor too little information. Each objective should be as brief as possible and as detailed as necessary. *Enough information should be provided so that two or more competent teachers, who have independently read the objective, would test and teach students to perform the same behaviors under essentially the same conditions and to the same standards.*

If, following an ecological inventory, enough information to write an instructional objective is not available, further study of a task may be required. Selected people from the target population may be asked to demonstrate the task. Important information can be gained from observing the performance of people who perform the task well and people who perform poorly. The performance of normal functioning people in the natural environment may also be observed. People responsible for writing the objectives may also perform the task themselves.

Several examples of instructional objectives from various areas of performance are listed below. These objectives are quite detailed. They describe exactly what task to teach and how to test its achievement. In the beginning, simpler objectives may be written. These objectives may be refined and expanded as experience with them increases.

Health: mixing a rehydration drink for a person with diarrhea.

Given: *Conditions:* a one liter bottle, a lighted fire, a pot, a source of unlimited water; two large, closed containers, one of salt, and one of sugar; and a request to, "Make a rehydration drink for someone with diarrhea." the student will:
Performance: fill the bottle with water mixed with sugar and salt to the following
Standards:
the water must be boiled before use;
the bottle must be rinsed with boiling water;
approximately 1/2 *tea*spoon of salt must be used (the mix should be no saltier than tears);
approximately two, level *table*spoons of sugar should be used;
both the sugar and water must be dissolved in the water;
the sugar and salt containers must remain dry and be reclosed after use, and
the fire must be left in a safe manner. (See Werner, 1985 for a more complete discussion of this topic).

Vocational: making a pair of sandals from rubber tires.

Given: *Conditions*: a rubber tire from an automobile (most of the tread has been worn away); a sheet of soft leather approximately 30cm square, and 3mm thick; a piece of firm leather, approximately 60cm square and 6mm thick; a sharp knife; leather glue and a person to fit for sandals, the student will
Performance: make a pair of sandals to the following
Standards: the portion of the tire touching the road is cut to make soles (tread side down);
the firm leather is cut to the same size as the sole and glued to the top side of the sole.
The soft leather is cut into strips, 2.5cm wide;
two parallel strips are laid across the top of the foot; these strips meet under the foot between the sole and insole.
Glue covers the entire surface between the sole and the insole; excess glue is removed.
The sole is cut from the centre of the tread, parallel to the sides of the tire so that when stepped upon, the sole lays flat. Each sole is at least the size of the outline of the person's foot and not more than 6mm larger than the outline.
The straps are tight enough so that a coin can be held without discomfort between the top of the foot and the strap. See Helander, Mendis and Nelson (1983) for a discussion on shoe making.

Academic: Language: present and past tense; positive and negative case.

Given: *Conditions*: teacher shows a glass that is randomly either empty (4 trials) or full (4 trials), and which remains in sight following display (1/2 the trials) or is removed from sight following display (1/2 the trials), and the request, "Tell me about the glass" the student will
Performance: say either that, "The glass *is* or *is not* or *was* or *was not* full or empty."
Standards: a correct response occurs when the student says *both* the correct verb tense "is or was" and whether the glass was "full or empty;" six out of eight trials correct is acceptable *(to make mistakes is human; some margin of error is acceptable in some tasks)*; however, no more than one error of each type is acceptable *(if more errors of one type occur, it may indicate that the student is not merely making a chance error, but that he or she has failed to learn to make a particular type of response)*. Record the first response made. No corrections are accepted.

An instructional objective describes a task in detail. To teach the task, a performance analysis must be done to identify the steps required to perform the task.

Performance Analysis

A *performance analysis* is a study made of a task to identify the steps involved in performing the task. The results of a performance analysis show what steps to teach. A *task* analysis includes conditions, performance and standards analyses (Baine, 1982). Only performance analyses are discussed in this chapter. The following list of steps shows the results of a performance analysis of the task of mixing a rehydration drink for people with diarrhea. This task is described in an instructional objective discussed earlier in this chapter.

Note that the results of the performance analysis list separately each step that must be taught separately. To learn a particular task, high functioning learners, may be required to learn three or four steps. To learn the same task, low functioning students may be required to learn 10-15 steps. For example, in the steps listed below, some learners may be able to learn in one step to "boil two liters of water in the pot." Other learners may have to learn three separate steps a) get the water, b) measure two liters and c) boil the water. The number of steps resulting from the performance analysis relates to the functional level of the students to whom the task will be taught. *List separately each step that must be taught separately to the LOWEST PERFORMER in the group of students to whom the task will be taught.*

a. Boil approximately 2.5 liters of water in the pot.
b. When the water has boiled for 5 minutes,

c. pour 1/2 liter of boiling water over the exterior of the bottle; insure that the neck and mouth of the bottle are sterilized.

d. Rinse the inside of the bottle with 1/2 liter of boiling water; pour the water out.

e. Fill 1/2 the bottle with the boiled water.

f. Measure the equivalent of 1/2 teaspoon of salt.

g. Put the salt in the water in the pot and stir until the salt is dissolved.

h. Taste the water. If the water is as salty as tears, proceed with step i. If the water is less salty than tears, add a little salt. Stir the water and taste again. Continue adding salt in this manner until the water is as salty as tears.

   If the water is saltier than tears, add some unsalted boiled water from the bottle. Continue this procedure until the water in the pot is as salty as tears.

i. Measure the equivalent of two level tablespoons of sugar.

j. Put the sugar in the water in the pot and stir until dissolved.

k. Pour the remainder of the boiled water from the bottle.

l. Pour the sugar and salt water from the pot into the bottle.

The results of this performance analysis show what steps to teach. The performance analysis must be done very carefully. All of the essential steps must be listed in the correct order. The information for doing the performance analysis is collected during the ecological inventory. If there is not enough information to do the performance analysis, further study of the task may be required. Selected people from the *target population* may be requested to demonstrate the task. Important information can be gained from observing the performance of people who perform the task well and people who perform poorly. The performance of normal functioning persons in the natural environment may also be observed. If the person doing the performance analysis is *very* familiar with the task, she may perform the analysis simply by very carefully thinking about (recalling) each of the steps required to perform the task.

For example, *without looking below*, write an instructional objective for the task of washing a sink. When you have finished, compare your objective with the objective that follows. Then, do a performance analysis on the objective printed below and compare your results with the performance analysis that follows.

Instructional objective

Given: *Conditions*: a sink with separate cold and hot water faucets, a drain plug, a container of cleansing powder, a clean cloth, and instructions to "Clean the sink." the student will
Performance: clean the sink to the following

Standards: each surface of the sink and the faucets must be firmly and repeatedly *rubbed* with the damp cloth and the cleansing powder;
all removable stain, oil or soil must be removed from all surfaces;
all cleansing powder must be removed from all surfaces;
no water or cleansing powder must remain on nearby surfaces, counters, walls or floor;
the cleansing powder container must remain dry;
no more than two teaspoons of cleansing powder must be used.

Performance analysis

a. Put the drain plug in the drain.
b. Fill the sink half-full with hot water that is comfortable to put hands into.
c. Wet the cloth in the water, wring, and lightly dampen the remaining part of the sink and faucets.
d. Remove the drain plug and drain the sink.
e. Put approximately one teaspoon of cleansing powder on the side of the sink away from the drain.
f. Place the damp cloth on the cleansing powder and rub the powder over the entire surface of the sink and faucets.
g. If stain, oil or soil is on the sink, repeatedly and firmly rub the surface until the stain, oil or soil is removed.
h. If more water and/or cleansing powder is required, repeat steps a-g, above.
i. When all removable stain, soil and oil have been removed, and when all surfaces of the sink and faucets have been repeatedly and firmly rubbed, run the hot and cold water to drain the bowl.
j. Rinse the cloth under the faucet and wring as dry as possible.
k. Wipe the clean cloth over all surfaces of the sink and faucets.
l. Repeat steps j. and k. until all surfaces are free of cleansing powder.
m. Rinse the cloth and wring as dry as possible.
n. Shut off the water.
o. Dry all surfaces of the sink, faucets and counter with the cloth.
p. If required, wring the cloth into the sink.
q. Wipe any water from the floor.

Of course there are often many different ways to perform the same task. The results of the performance analyses of these various methods, however, should all list the same *essential* steps. Instructional objectives, task analysis and performance analyses are discussed in Baine (1982) and Socrates (1983). Examples of performance analyses can be found in a cur-

riculum developed by the Special Education Division of The Community College of Micronesia (1986). The Instructional Objectives Exchange publishes collections of instructional objectives related to most school subjects: reading, language, mathematics, etc. The remainder of this chapter describes how to teach the steps identified in a performance analysis.

Using Prompting and Fading to Teach Motor Responses

A prompt is a form of temporary assistance used to help a student perform in a desired manner. When a student is unable to perform a task, a *prompt (temporary assistance)* is used to help the student perform the task. As the student learns to perform the task, the temporary prompt is *faded (slowly removed)* from use. Several different types of prompts and methods of fading them are discussed below. Portions of the following discussion are adapted from Baine (1986a).

In the example, that follows, verbal, gestural, modeling and physical prompts are used to teach a student to perform a step in the performance analysis listed above, "g. If stain, oil or soil is on the sink, repeatedly and firmly rub the surface until removed."

a. Teaching begins with a *verbal request*, the teacher says, "Remove the stain." If the student removes the stain, no prompts are required. If the student fails to remove the stain, prompts are used.

b. *Verbal request plus verbal prompt (additional verbal instructions):* teacher says, "Remove the stain." "Rub the cloth on the stain with your thumb" (tells how to remove the stain). If the student removes the stain, no further prompts are required. If the student fails to remove the stain, additional prompts are added.

c. *Verbal request plus verbal prompt and a gestural prompt*: teacher says, "Remove the stain." "Rub the cloth on the stain with your thumb." Teacher also *points* (gestures) to the student's thumb and to the stain. If the student removes the stain, no further prompts are required. If the student fails to remove the stain, additional prompts are added.

d. *Verbal request plus verbal prompt and modeling prompt*: the teacher says, "Remove the stain." "Rub the cloth on the stain with your thumb," and the teacher models (demonstrates) rubbing the cloth on the stain with his thumb. Then, the student is again, asked to "Remove the stain." "Rub the cloth on the stain with your thumb." If the student *imitates* (copies) the teacher's model, and rubs the cloth on the stain with her thumb until the stain is removed, no further prompts are required. If the student fails to remove the stain, additional prompts are added.

e. *Verbal request plus verbal prompt and physical prompt*: the teacher says, "Remove the stain." "Rub the cloth on the stain with your

thumb." At the same time, the teachers holds the student's hand, presses down on her thumb and rubs it on the stain.

Verbal prompts

Verbal prompts may involve the following:

a. Giving additional instructions, e.g., "Rub the cloth on the stain with your thumb."

b. Emphasizing important words by saying them louder or longer: "RRRUUUBBB the cloth on the stain with your TTTHHHUUUMMMBBB."

c. Giving single word reminders: "RUB or rrruuubbb."

d. *Pausing*: "Rub the cloth (pause) on the stain (pause) with your thumb." The pauses are designed to bring attention to each important part of the instructions. Pausing may also be used to focus a student's attention on an important word. For example, "Rub the cloth (pause) ON the stain with your thumb." Here, attention is focussed on the word "on."

e. *Leading* is used when a teacher says what the student is to say at the same time as the student is trying to say it. For example, if a teacher was teaching the spelling rule, "'i' before 'e' except after 'c'," and the student was unable to say the rule, when the teacher asked, "What is the rule?" the teacher could use leading. "When the teacher asked, "What is the rule?" the teacher would say, "'i' before 'e' except after 'c'" at the same time as the student tried to say it. The teacher would repeatedly lead the student to make the correct response.

Rules for using and fading verbal prompts

a. Make sure you have the student's attention before giving a verbal prompt.

b. Be brief. Make all verbal instructions as short as possible.

c. Use language the student understands.

d. Be consistent. If the student responds in the desired manner following a verbal prompt, use the same verbal prompt each time the task is practiced.

e. Always say the *verbal request*, for example, "Remove the stain." before saying the verbal prompt, for example, "Rub the cloth on the stain with your thumb."

f. Use a prompt only if a student is unable to perform in the desired manner without the prompt.

g. Verbal prompts may be faded from use in the following manner:

- *Progressive delay*: on consecutive trials, following the verbal request, "Remove the stain" (RTS) the teacher may delay

giving the verbal prompt, "Rub the cloth on the stain with your thumb," (RTC) for successively longer periods of time.

For example:

trial 1. no delay between RTS and RTC;

trial 2. 1 second delay between RTS and RTC;

trial 3. 2 second delay between RTS and RTC;

trial 4. although the teacher had intended to use a 3 second delay, the student made the correct response before the RTC was given. Thus, through progressive delay, the verbal prompt was faded.

- *Shorten*: if the teacher is using a long verbal prompt to help the student, over several trials, the prompt may be shortened. For example, the verbal prompt, "Rub the cloth on the stain with your thumb," may be shortened over successive trials in the following manner:

trial 1. "Rub the cloth on the stain with your thumb."

trial 2. "Rub the stain with your thumb."

trial 3. "Rub the stain."

trial 4. "Rub."

- *Using both delay and shortening*. This approach may be more effective than using either method alone. The goals are a) *use a prompt only if necessary* and b) *fade the prompt, as soon as possible*, so that the student can respond without unnecessary assistance.

- *Fading leading*. When leading begins, a teacher uses a full voice. Later, the teacher's voice may become softer and softer. Important words may be said a little louder than others. Finally, the teacher's voice fades completely until the students can say the rule without the teacher leading them.

Gestural prompts

Gestural prompts may involve:

a. *Pointing*: the teacher may point to the place where the response is to be made (e.g., at the stain) or to the equipment to be used for making the response (e.g., the thumb). Most often the gestural prompt should be used following the verbal prompt. Then, after the gestural prompt has been faded from use, the verbal prompt is faded until the student is able to make the desired response following the verbal request alone.

b. *Tapping*: the teacher may make a noise by tapping his finger where the response is to be made (e.g., on the stain) or on the equipment to be used to make the response (e.g., on the thumb).

c. *Tracing*: while the verbal prompt is being given, the teacher may use his finger to relate the parts of the task to each other. For example, as the prompt, "Rub the cloth on the stain with your thumb" is stated, the teacher may trace his finger through the air from the cloth, to the stain and then to the thumb.

d. *Signals*: when teaching a group, a teacher may use a signal to get everyone in the group to answer at the same time. For example, if the teacher wanted everyone in a group of students to say the spelling rule, "'i' before 'e' except after 'c'," at the same time, a signal would be used. The teacher would hold his hand out in front of the group and say, "Tell me the spelling rule." Then he would raise his hand to his shoulder and hold it there to give the slowest child in the group time to think of the rule. Finally, he would drop his hand to signal that everyone should answer. When everyone answers at the same time, everyone has to prepare his or her own response and cannot simply copy the answers made by other students. The teacher's hand movements are signals for the students to wait, think and respond.

e. *Clapping*: during group instruction, when students are being taught to read, the teacher may clap her hands each time the students are to read a new word in a sentence. The pause between each clap gives the slowest student time to prepare the word before reading it aloud. The students can hear the clap without looking up from their work.

Rules for using and fading gestural prompts

a. Make sure you have the student's attention before using a prompt.

b. Be consistent. If the student responds in the desired manner following the gestural prompt, use the same gestural prompt each time the task is practiced.

c. Be brief. Do not use extra movements that may distract the student.

d. Use a gestural prompt only if a verbal prompt is not sufficient.

e. Always state the verbal prompt, for example, "Rub the cloth on the stain with your thumb." before or as, the gestural prompt is being made.

f. Fade the gestural prompt before fading the verbal prompt.

g. Fade the gestural prompt by:

- *Delay*: when it looks as if the student may be able to respond without the gestural prompt, give the verbal prompt first, then delay giving the gestural prompt for successively longer periods, in the same manner as delay was previously described.

- *Shorten*: the length of the gestural prompt may be shortened. The teacher, rather than trace her finger from the cloth, to the

stain to the thumb, may over successive trials, trace from the stain to the thumb and finally only to the thumb.

Modeling

Modeling is a method of teaching by demonstration. A teacher models how a task is to be done. The student is supposed to *imitate the model (do the task in the same way).* Modeling can be used as a prompt. When a student fails to perform in the desired manner following a verbal prompt and a gestural prompt, a modeling prompt may be used. The modeling prompt is usually used at the same time as a verbal prompt is used.

Rules for using and fading modeling prompts

a. Get the student's attention before beginning to model.

b. Demonstrate each part of the task slowly enough so that the student can study it.

c. Focus the student's attention by labelling each important part of the task. For example, rather than simply showing a student how to hold a pencil during writing, a teacher may point (a gestural prompt) to where the pencil rests on the teacher's hand between the thumb and the forefinger and say; "it touches my thumb here and my finger here." The teacher may later *confirm* that the student has seen the important features of the demonstration by asking the student to point to where the pencil touches (Baine, 1986b).

d. If a task involves a long series of steps, the demonstration may be divided into parts. The teacher may have the student repeatedly imitate the first several steps. Then, later steps in the task may be modeled and imitated several times. Eventually, the student should be given repeated practice performing *all* steps of the task, in order, without interruption. The number of steps that should be modeled at any one time depends on the difficulty of the task and the skills of the student.

e. Sometimes it is important for the teacher to stand or sit beside a student while modeling. For example, if a teacher is standing opposite a student while showing how to hit a nail with a hammer, the teacher might hold the hammer with his right hand and the nail with the left hand. If the student *mirrors* what the teacher did, the student will hold the hammer and the nail with the wrong hands and the task will be very difficult. The demonstration would be simpler if the teacher stood or sat beside the student. Alternatively, for some demonstrations, the teacher may stand behind and reach around a student while demonstrating.

f. Modeling is faded by using gestural and verbal prompts. After repeated demonstrations, the teacher does less and less modeling and more and more gesturing. Over several trials, these gestures

and the verbal prompts are also faded until the student is able to perform without any prompts (Baine, 1986a).

Physical prompting

In physical prompting, a teacher uses her hands to move a student through the steps in a task. For example, when teaching a student to husk coconuts, a teacher may follow the stages below.

a. *Full physical prompt*: initially the teacher puts her hands fully upon the student's hands to help her to hold the bigger end of the coconut over the sharp end of the husking stick. The teacher moves the student's hands and the coconut halfway up to the student's chin. The teacher then moves the student's hands down to drive the coconut with force onto the end of the husking stick.

b. *Partial physical prompt*: over several trials the teacher slowly reduces the amount of guidance and offers assistance only as much as is required, when and as required. For example, the teacher's hands may *shadow* (*follow without touching*) the student's hands and only touch and assist as required. For example, the teacher may only touch the student during the downward movement of the coconut to guide it onto the husking stick.

c. *Shadowing* may be continued until the student does not require any assistance for several trials.

d. *Graduated guidance*: a method of prompting and fading using physical prompts a) begin with as much physical assistance as is necessary, b) use the minimum amount of pressure for the motion to be completed, c) concentrate on the body part that is the focus of the action, e.g., when feeding, focus on the hand; d) gradually reduce the pressure applied, and e) move the guidance away from the focus of the action, e.g., when feeding, move assistance from the hand, to the wrist, and then to the elbow (Foxx & Azrin, 1972).

Using prompting and fading

Prompts may be used in several ways. As was discussed above, prompts may be used in a "least-to-most intrusive prompts sequence." If the student did not make the desired response following the verbal request, prompts were introduced in the following manner.

"Least-to-most prompts sequence."
level 1. Verbal request (VR)
level 2. VR + verbal prompt (VP)
level 3. VR + VP + gestural prompt (GP)
level 4. VR + VP + modeling prompt (MP)
level 5. VR + VP + physical prompt (PP)

The teacher begins instruction at level 1. If no response, is made within 3-5 seconds, increasing levels of prompting are introduced until

the student is able to make the desired response. Levels 1-5 indicate increasing amounts of teacher assistance. There are two reasons for introducing prompts in the "least-to-most prompts sequence." First, the purpose is to use the least teacher assistance possible. The student is made less dependent on a teacher's help. Secondly, the sequence, when used in reverse, assists fading the prompts. For example, if a student was being taught to get the milk from coconuts, prompting levels 2, 3 and 4 may be introduced until the student was able to perform the desired response. These prompts would then be faded out in the reverse manner from level 4 to 3 to 2 to 1. First, the modeling prompt would be faded to gestures (the gestures may be a part of the previous model). The gestural prompt would then be faded until only the verbal prompt and the verbal request remained. Finally, the verbal prompt would be faded. The reason for fading the prompts slowly from levels 5 to 1 is to avoid collapse of the newly learned response. A general rule for fading prompts is, *after the student has made the correct response with the help of a prompt 2, 3, or 4 times (depending on the learner), start to fade the prompt.* The goal is to have the student respond independently, without a prompt, as soon as possible. However, if the prompt is faded too rapidly, the response may collapse.

After a teacher has worked with a student on a variety of tasks, the teacher will know which level of prompting a student is likely to need. It would be a waste of time using prompting levels 2, 3 and 4, if the teacher already knew that the student would require a level 5 prompt. In this case, level 5 prompting should be used directly. Also, a teacher's experience with a student may indicate that rather than fading prompts from levels 5 to 4 to 3 to 2 to 1, it may be possible to *drop* the prompts from level 5 to 1 directly. If it seems possible to drop the prompts abruptly, without losing the newly learned response—do so. Because handicapped students are slow to learn, it is important not to further handicap them with inefficient methods of teaching.

In the previous discussion, teaching always began with a verbal request, a request made by the teacher for a student to perform a task. If the student failed to perform following the request, prompts were introduced. When the student was able to make a response with prompting, the prompts were faded from use until only the teacher's verbal request remained. Although this procedure is common, it is an incomplete technique. A student should not be taught to make a response only when there is verbal request to perform the response. The student must be taught to identify when a response should be made in the natural environment. *To teach a student when it is appropriate to make a response in the natural environment, focus attention on NATURAL CUES before giving the verbal request to perform the response.*

Focus attention on the NATURAL CUES	BEFORE	giving the VERBAL REQUEST

Natural cues are signs that occur in the natural environment indicating when particular responses should be made. For example, the smell of

smoke is a natural cue for blind children to leave a building. It would be inappropriate to teach blind children to leave the building only following a verbal request "This is a fire drill; leave the building." To teach blind children to leave the building when they smell smoke, the children should focus attention on the natural cues *before* the verbal request is given. For instance, a bucket of smoking, damp straw could be brought into a room of blind children. The teacher would then give the verbal request, "When you smell smoke, leave the building." Later, when the children had learned what they were supposed to do when they smelled smoke, the verbal request could be faded from use by delaying and/or shortening.

In all teaching, care must be taken to identify the natural cues that indicate when a response should be made. Student attention must be drawn to these cues *before* the verbal request is given. After several trials, when the relationship between the natural cues and the response has been established, the verbal request should be faded.

Using prompting and fading to teach discriminations

The previous discussion related to prompting motor responses. The following discussion concerns prompting discriminations. An example of a *simple discrimination* is the selection of one object from another on the basis of the features of the object selected. For instance, a student is shown pictures, one of an elephant and one of a giraffe. She is then asked to "Point to (discriminate) the giraffe." The pictures are presented repeatedly and in random positions. If the student is able to repeatedly point to the picture of the giraffe, she has learned to discriminate the features of the giraffe (long legs and neck) from those of the elephant (fat body and long trunk). Students may be taught to discriminate things on the basis of differences in sound, appearance, and/or texture, etc. For example, students learning to read may be taught to discriminate the sound made by the words "run and runs."

Prompting and fading may be used to teach discriminations. To teach students to discriminate the difference between the sounds made by the words "run and runs," the teacher may randomly present pairs of words "run and run" (both the same) and "run and runs" (one word is different), and "runs and run." The student may be asked to say if the words in each pair are the same or different. The student will consistently identify the pair of different words, if she learns to discriminate the "s" sound at the end of "runs." Prompts may be used to focus the student's attention on the "s" sound.

The usual approach to prompt the student's attention to the "s" sound would be to make the "s" sound louder or longer as in: "run and runS" or "run and runsss" or "run and runSSS." When any of these approaches are used, the student will soon learn to identify which pair of words is different. However, THIS IS THE WRONG USE OF PROMPTS. The student will be able to tell which pair of word is different simply by listening to the prompt, rather than listening to the "s" sound. Only the pair of words

that is different has the prompt. To avoid this problem, both sets of words should be prompted. For example: "ruN and ruN" and "ruN and ruNS." When prompts are used in this manner, the student's attention is focussed on the ends of the words. To discriminate the words the learner must attend to *both* the prompt *and* the "s" sound. *When using prompts to teach discrimination, be certain the student cannot make the correct choice simply by focussing on the prompt. The student must also focus on the essential features.*

If you were teaching a student to discriminate pictures of elephants and giraffes, without reading any further, decide how you would use prompts. The discrimination could be made on the basis of legs: short and fat or long and thin. If you suggested that the legs of the giraffe could be colored red to focus the student's attention, YOU WERE WRONG, unless you also suggested coloring the legs of the elephant red. If only the giraffe's legs were colored red, the student would be able to select the giraffe merely because it was the only animal with red legs, not because it was the only animal with long legs.

Once the student has learned to make the response 2, 3 or 4 times (depending on the learner), start to *fade* the prompts. For the elephants and giraffes, slowly fade the red coloring from their legs. Fade the color at the same rate on both animals. For the words "ruN and ruN" and "ruN and ruNS," start saying the "N" and the "NS" sounds less and less loudly until they are stated in a normal manner.

Prompting and fading are also discussed in Baine (1982), Billingsley and Romer (1983) and Sulzer-Azaroff and Mayer (1977).

Teaching Chains

Simply stated, a chain is the sequence of steps required to perform a task. The steps in a chain are identified by doing a performance analysis. A chain of steps is identified through a performance analysis of the following instructional objective.

> Given (conditions): a chicken house in which there are 3-5 nesting boxes lined with suitable nesting material; randomly either 0 or 1-3 unbroken eggs variously located anywhere in each of the nests; no chickens in any of the nests; a basket or pail with nesting material in the bottom, and a request such as, "Collect the eggs." the child will (performance) collect the eggs to the following standards a) all of the eggs must be collected on each trial; b) breakage of up to 10% is acceptable; c) all nesting materials must be evenly redistributed over the floor of each nesting box (Baine, 1987a).
>
> Results of performance analysis.
>
> a. Remove each visible egg from nesting box 1.
> b. Gently place each egg individually into the pail. Place the eggs in a stable position, away from the edge of the pail and away from other eggs. If eggs must touch, each other or the side of the pail, place them in a stable position.

c. Search within, under and behind the nesting material for additional eggs. If more eggs are found, do step b.

d. Evenly redistribute the nesting material over the floor of the box.

e. Do steps a.-d. for each of the remaining nesting boxes in order.

This chain of steps may be taught in several different ways. Methods called: forward chaining, reverse chaining and total task presentation may be used.

Forward chaining

Forward chaining is the method most often used. Forward chaining is done in the following manner.

Phase one:

a. Prompts are used to *teach* the student to perform step a. remove visible eggs from box 1.

b. The teacher *may* then *model* the remaining steps b.-e. in the chain.

Phase two:

a. The student *practices* the step she has learned, a. removing visible eggs from box 1.

b. The teacher uses prompts to *teach* step b. placing the eggs in the pail.

c. The teacher *may* then *model* the remaining steps c.-e. in the chain.

Phase three:

a. The student *practices* the steps she has learned, a. removing visible eggs from box 1. and placing them in the pail.

b. The teacher uses prompts to *teach* step c. searching the box.

c. The teacher *may* then *model* the remaining steps d.-e. in the chain.

Instruction continues in this manner until all the steps in the chain are taught. This teaching method is called forward chaining because the student is taught to perform the steps in the order a, b, c, d, then e. Step a. is learned before step b. is taught. In some cases, for example, with long tasks, the teacher may not model the remaining steps in each phase. The student may simply be taught to perform one step before the next step is introduced and taught.

Reverse chaining

In reverse chaining, the student is *taught* the steps in the reverse order: e, d, c, b and a as follows.

Phase one:

a. The teacher *models* steps a.-e.

Phase two:

a. The teacher *models* steps a.-d.

b. Prompts are used to teach the student to perform step e. The student learns the final step in the chain first.

Phase three:

a. The teacher *models* steps a.-c.

b. Prompts are used to *teach* step d.

c. The student *practices* step d then step e, *in order*.

Phase four

a. The teacher *models* steps a.-b.

b. Prompts are used to *teach* step c.

c. The student *practices* steps c, d and e *in order*.

Instruction continues in this manner until all the steps in the chain are taught. As was mentioned, forward chaining is the usual method of teaching the steps in a task. Reverse chaining may have the advantage of giving a student a sense of achievement. The student performs the last step in a task first. Completion of the task in this manner may be motivating.

The basic rules for chaining

a. The student should always perform the steps in the order in which they are listed in the chain a, b, c, d and e. Note that even in reverse chaining the learner always performs the steps in the correct order.

b. Perform each step in the chain as quickly as possible following the previous step. For example, as quickly as possible, the student should do step d. following step c. Performing steps in this manner helps to *link* the steps in the chain so that no steps will be forgotten.

Sometimes when a step in a chain is difficult to teach, the step may be taught in advance. For example, if a teacher knew that step c. in the chain a, b, c, d and e was usually hard to learn, the teacher could teach step c first. Then, the teacher could use forward or reverse chaining to teach and link the steps a, b, c, d and e. If the teacher tried to teach the difficult step c while chaining, without teaching it in advance, she may have difficulty linking steps b, c and d.

Total task presentation

An alternative method of teaching chains is total task presentation. In this method the teacher uses prompts to teach all of the steps in the chain at the same time.

Phase one

a. Verbal and gestural prompts may be used to teach step a.

b. Verbal and physical prompts may be used to teach step b.

c. Verbal and physical prompts may be used to teach step c.

d. Verbal prompts may be used to teach step d.

e. Verbal and physical prompts may be used to teach step e.

Since the least prompting was required to teach step d., prompting may be faded from this step first. Thus, in the next phase of teaching, the teacher will continue to prompt the student to perform steps a, b, c and e. The student will perform step d. independently. In the total task presentation method, prompts are faded from each step as soon as possible, and in whatever order possible. Note that in the total task method, although the student may learn to perform the steps independently in the order d, a, e, b and c, the steps are always practiced in the order a, b, c, d and e. Chaining and total task methods are discussed in Baine (1982), Spooner (1984), Spooner and Spooner (1984) and in Sulzer-Azaroff and Mayer (1977). There is some evidence to suggest that the total task method may be the most effective procedure. There is not, however, strong agreement on this point, and the most suitable method may depend on the nature of the task and the student. Effectiveness of these methods is measured by the time taken to learn the skill being taught, the number and type of errors and correct responses made, as well as the generalization and maintenance of learning.

Rewards

Many people do long and hard tasks in the hot sun every day. They do things like plowing, digging, planting, carrying water, picking and carrying crops. There is no one in the field giving them rewards because they did their jobs. They seem to do these tasks simply because it is their job to do this hard work.

These people, however, are doing these jobs only because they are being rewarded. Because they work, they receive money and/or food. If they did not receive these rewards, they would stop working hard in the hot sun (Baine, 1986a).

For students with handicaps, school work is also very hard. Students who fail often get few rewards. They do not like to do school work because it is not rewarding. For students who find school work hard, or who have to make great efforts for little or no rewards, it is necessary for the teacher to give them rewards. The rewards given by the teacher increase the student's motivation to work hard. When a student's hard work results in learning to perform functional tasks, these tasks produce their own rewards. Then, the teacher may fade her rewards from that task and begin to reward the student for working hard to learn other tasks. Teacher rewards are used temporarily. There are a number of different types of rewards teachers can use. Note, that the type of reward that will be effective will depend on the type of student, the type of task and the culture. Some rewards will be very effective in some cultures, with some students, and for some tasks. With other cultures, students, and tasks, however, these same "rewards" may be quite inappropriate. These "rewards" may even have quite an undesirable effect.

Descriptive praise

Descriptive praise involves praise plus a brief statement describing why the student is being praised. "Good work. There are no scales left on the fish." Students should be rewarded not only for their achievements but also for their efforts. For some students, considerable effort must be made before any achievements will be seen. If the teacher wants to maintain these efforts, rewards must be given. "You try very hard. I'm proud of you." Students should also be rewarded for their style of work. "Well done. You are reading carefully." When the praise describes good characteristics of the student's work, the student knows exactly what to do to get more praise. Descriptive praise should be used with most of the following types of rewards.

Social praise

In some cultures, students may find it rewarding to have the teacher smile, nod at them, shake the student's hand, or put their arm on the student's shoulder. As was mentioned, in some cultures, or with some students, any or all of these "rewards" may not be suitable. Often when a student performs poorly, a teacher will spend time talking to the student. The teacher's attention may, thereby, inadvertently reward and increase poor work. Instead, teacher attention should be given only to students who try hard or who show improvement. Many students find it very rewarding when a teacher spends one, two or three minutes talking to them. Social praise should be used together with descriptive praise. For example, a teacher may *smile, put her hand on the student's shoulder* and say, "I am very happy with all of the arithmetic problems you have done." If the same reward is available too often, it loses its reward value. For example, food can be very rewarding. Being given too much food, however, can be punishing. Similarly, it is important not to use the same type of reward too often. Use a variety of different kinds of descriptive and social praise. Also, use a variety of the following types of rewards.

Special privileges

Students who improve, work hard or achieve highly may be given special privileges as rewards. Special privileges may include: being excused from an exam (can be very rewarding), time to work at the teacher's desk, permission to listen to a radio, the opportunity to eat lunch with the teacher, permission to use the teacher's pen, time to use a typewriter, etc. Descriptive praise should be used when the special privilege is awarded so that the student will know why she is being rewarded. Social praise may also be used at the same time.

Food rewards

For most students, descriptive and social praise, and special privileges will be sufficient rewards. With some students, however, these rewards may not be adequate and food rewards may be required. Students who work hard, show improvement, and/or achieve highly may be given a

piece of banana, some peanuts, water, juice or a drink of tea as a reward. Although food rewards may be very effective, they should be avoided. Whenever possible, it is desirable to use rewards that are the same as, or similar to, those given for performing the behavior in the natural environment. Food is not often given for performing a behavior in the natural environment. However, if social and descriptive praise are not rewarding, use food as a reward. Note, however, that each time food is awarded, descriptive and/or social praise should also be used. Because the descriptive and social praise are repeatedly associated with the rewarding food, praise will also become rewarding. After using praise and food together repeatedly, try not using the food once, then twice, then once, then three times, etc. until food is no longer used as a reward.

Token rewards

Few things are rewarding to all people, all of the time. Ideally, a teacher should have available different rewards for different students and different tasks. It might be very difficult for the teacher to carry all of these rewards. Also, it may be quite disruptive to award food or special privileges during teaching. Instead, token awards can be used. When a student performs well, she is given a token (a mark on a piece of paper, or a piece of metal or plastic). Later, at a scheduled time, the number of tokens the student has earned are counted. These tokens, like money, may be used to purchase rewards from a *token store*. The token store should be stocked with a variety of rewards so that for each student in the classroom, there will always be something rewarding. A token store may be stocked with: toys, radios and sports equipment that can be *rented* for short-term use. Food (bananas, mangos, raisins, peanuts) may be available. Pencils, erasers, paper and books may be *purchased*. Students may also be able to buy privilege tickets to be excused from an exam or class of their choice. Creativity should be used to get inexpensive and attractive items for the store. A range of items costing few and many tokens should be available. Some rewards in the store may cost few tokens. Other rewards may cost many tokens and students may be required to save tokens for a week before purchasing these rewards. The token cost of each item should be clearly marked. In the beginning, items in the store should not cost many tokens. As time passes, higher cost items should be introduced. Tokens may be rewarded for a variety of social and academic behaviors. The number of tokens rewarded and the cost of items in the store must be adjusted to insure that students have neither too many nor too few tokens. Each student must earn enough tokens to buy items from the store often enough to make work and effort rewarding. Tokens must be sufficiently hard to earn and sufficiently rewarding to insure that students work hard to get them.

The tokens used should be things that are not readily available from any other source. One convenient way to award tokens is to make a special mark on a sheet of paper. A page of paper may be divided into squares. Tokens may be awarded when the teacher marks her initials in a

square. Descriptive praise should be used each time a token is awarded. Token rewards are fully discussed in Sulzer-Azaroff and Mayer (1977) and in Walker and Buckley (1974). Homme (1972) has written a book on the related topic of *contingency contracting* in the classroom. Contingency contracting involves writing an individual performance contract with a student. The contract describes a student's responsibilities and the rewards the teacher will give the student when the student performs the responsibilities.

Rules for using rewards

a. Rewards should be given as soon as possible following a desired behavior. The closer the reward is to the behavior, the easier it will be for the student to see the relationship between the behavior and the reward.

b. Use brief descriptive praise each time a reward is given. Social praise may also be given at the same time. Descriptive praise tells the student what she did well so that she will know what to do again.

c. Remember: *a reward is something that increases how often a behavior occurs.* Something that a teacher thinks may be rewarding may not be rewarding to a student. *If it did not increase the student's behavior, it was not rewarding.* What is rewarding to one student may not be rewarding to another. What is rewarding to one student at one time, may not be rewarding to the same student at another time. With overuse, a reward may lose its value. Therefore, always monitor the effect of each reward. Also, use a variety of descriptive, social and privilege rewards.

d. When you want to increase how often a behavior occurs, give rewards when the behavior occurs. In the beginning, give rewards at least 80% of the times the behavior occurs. Frequent rewards help to establish the relationship between the behavior and the rewards. When the behavior becomes established, start to reduce slowly the number of times the behavior is rewarded. Make it hard for the student to predict when she will be rewarded. Once a behavior is established, unpredictable and infrequent rewards make a behavior strong and durable.

e. If a teacher waits until handicapped students make big achievements (complete a large section of work or get all of a number of problems correct) there may be few opportunities to give rewards. Students may become discouraged. Instead, students should be rewarded for working hard, for working for long periods and for working carefully. Reward good work habits as well as achievements. Good work habits lead to high achievements.

f. People work for rewards. Students may not work because they do not find school work rewarding. Teacher's rewards may be used

temporarily to motivate students to do school work well. The temporary, teacher rewards must be slowly removed as students learn to work well. The students must also be taught to identify the rewards given to each behavior in the natural environment. If a teacher rewards a particular behavior with praise, and if praise is never given for that behavior in the natural environment, the behavior may not occur in the natural environment.

Thus, whenever possible, the reward given by the teacher should be the same or as similar as possible to the reward given to that behavior in the natural environment. If the reward given by the teacher is different from the reward given for the behavior in the natural environment, the following methods should be used. One, the teacher should tell the student why his newly learned behavior is important, how it is useful and how it will be rewarded in the natural environment. Two, each time the teacher gives a reward, he should also give the natural reward. Then, over time, the teacher's reward can be faded from use until only the naturally occurring reward is used.

Using rewards is an important and complicated skill. There are a variety of different methods not referred to in this text. A textbook by Sulzer-Azaroff and Mayer (1977) offers excellent, although sometimes technical advice. Becker (1971) and Patterson (1980) have written simple introductory information about the use of rewards and other behavior management procedures related to *family living* (note: information in these books is culturally biased and may not be universally suitable).

Using rewards to teach chains

Rewards are also used to teach chains. Suppose that a student was being taught the steps in lighting a kerosene lamp.

a. The lid is screwed off the fuel reservoir.
b. The funnel is put into the reservoir.
c. The kerosene container is opened.
d. Kerosene is poured into the reservoir.

As was mentioned earlier, when the chain is first being taught, prompts would be used to teach each step. A student would also be rewarded for her efforts in attempting to perform each step. Usually, descriptive and/or social praise would be sufficient. For example, descriptive praise: "*Good*, you got the lid off easily." or "*Well done*, the whole end of the funnel is inside." (rewards the student and describes an important feature of performance, the whole end of the funnel should be inside). A reward would also be given for completion of the entire chain. For example, "*Great job.* Soon you will be able to do this yourself." The natural occurring reward at the end of the task should also be taught. "There now

you can see to work and walk in the dark. You won't hurt your eyes and you will not fall over things."

Shaping

Shaping involves making *successive changes* in a behavior. For example, the *desired behavior* may be to have a student carry 10 liters of water from one location to another. If the student is initially unable to pick up and/or carry more than 4 liters, the teacher might use shaping and request the student to lift and carry only 3.5 liters (slightly less than he/she is already able to carry). After several trials, during which the student grew stronger and more skilled, the teacher may ask the student to lift and carry 5 liters. Again, after several trials, during which the student improved, the amount of water may be increased to 7, to 9 liters, and finally to 10 liters.

In the example described, the student was unable simply to improve his performance from carrying 4 to carrying 10 liters. The change was too great. Because the change was too great, the teacher used shaping, and the student's performance was improved in successive steps. Sometimes teachers expect students to make changes that are too great. For example, if the teacher had not used shaping and had demanded that the student improve directly from carrying 4 to carrying 10 liters, both the teacher and the student would have failed. Both the student and the teacher might have become frustrated and angry.

As mentioned, shaping is used when a desired change in behavior is too large to make directly and the student cannot simply be prompted (helped) to make the change. Shaping is also used when the student is unable to make a desired response. the teacher identifies the closest response the student is able to make. This response is then successively changed into the desired response. For example, if a student is unable to say "water" and the closest sound he can make is "wa-wa," then shaping may be used to change "wa-wa" through successive steps to "watah" and finally to "water." Shaping is also used when the change demanded would result in a negative response. For example, if a child who moves around frequently is required to sit for a long period of time, the child may become angry and may have a temper tantrum. Alternatively, if shaping is used and the child is required to sit for successively longer periods of time, the change might be successful.

The steps involved in developing a shaping program are as follows:

a. Define the desired behavior you want the student to perform, for example, INCREASE: "work at an assigned task for at least 10 minutes without staring into space for more than 2 minutes"; "correctly solve at least 75% of assigned multiplication problems"; DECREASE: in a vocational training program, "decrease the amount of time taken to make a standard basket to 90 minutes or less." CHANGE the form of the behavior. For children unable to print letters of the alphabet, but who can draw primitive marks on a page, shape the primitive marks into well-formed letters, "copy any of the letters of the alphabet: straight lines are drawn

in an appropriate vertical, horizontal or diagonal manner; curved lines are drawn in an appropriate shape, and all parts are of a proportionate size and joined as and where appropriate into readily recognizable letters."

b. Identify the behaviors that the student can already perform that are as close as possible to the desired behavior. For example, *goal:* make basket in 90 minutes; *now:* makes basket in 180 minutes; *goal:* copy well-formed letters; *now:* when given an example, makes an approximation of a vertical lines. Start training by asking the student to do what he is already capable of doing. Reward him for his work several times before asking him to do more or less, as appropriate.

c. After repeatedly observing the student's rate and style of performance, estimate how much change she is capable of making in one step. For example, if the student has been correctly solving between 4 and 6 multiplication problems within a 10-minute period, and you think that she is capable of solving more problems while maintaining her accuracy, predict how many more problems you think she is currently able to do. The goal is to ask her to improve as much as you think she is able to improve. However, if your demand is too great, the student will not be able to make the change and will fail. To avoid this problem, estimate how much you think the student is able to change, then slightly reduce the amount of change required. When you have decided how much of a change to require, inform the student, "Do 8 multiplication problems correctly within 10 minutes." The student will then be required to solve 8 or more problems correctly before being rewarded. Continue to shape the learner's performance in this manner (successive change) until the desired level or type of performance has been achieved.

d. Of course, for the shaping procedure to be successful, it is important to select suitable methods for rewarding the student's improvements in performance. Remember, change for anyone is difficult to make, and successful change should be well rewarded. Also, success will be influenced by the selection of appropriate prompts to assist the student at each successive level of performance.

Shaping is very effective. However, it is also time-consuming and requires a lot of teacher effort. Therefore shaping should only be used when other techniques such as prompting, modeling and instruction are ineffective in achieving a desired change. Additional examples of shaping are found in Sulzer-Azaroff and Mayer (1977).

Chapter Five

Teaching Methods: Two

The goals of this chapter are as follows.

a. Describe the "Attention, Model, Prompt and Test Teaching Method."
b. Demonstrate application of the "Attention, Model, Prompt and Test Teaching Method" for teaching individuals and small groups of students.
c. Discuss various methods of individualizing instruction.
d. Review concurrent and sequential methods of group instruction.
e. Illustrate the steps involved in designing a teaching sequence.

Individual Instruction

The "attention, model, prompt and test teaching method" for one-to-one teaching

This teaching method can be used, with minor changes, to teach single students or groups of students. The method is a modification of a technique initially described by Becker, Engelmann and Thomas (1971). Examples of the method applied to the teaching of reading and mathematics may be found in Carnine and Silbert (1979) and Silbert, Carnine and Stein (1981). In the following example, the method is being used to teach a single student a motor response. The student is taught how to adjust the wick on a kerosene lamp, a single step in a chain.

STEP	EXAMPLE
a. Get student's *attention*:	"Nabu, (student's name) watch me."
b. Focus *attention*:	The teacher slowly moves her hand from in front of her face to the wick, adjusting knob.
c. *Model* the task to be learned.	"Watch. I adjust the wick. When I turn the knob this way, the wick comes up." "Make the wick come this far above the cover."
d. Repeat the *model*, as required. (Optional)	"Watch. I adjust the wick. When I turn this knob this way, the wick comes up." "Make the wick come this far above the cover."

e. *Test* and *prompt*. (Use verbal, gestural, or physical prompts as required).	"You adjust the wick." Verbal: "Turn the knob the other way." Verbal and gestural: "Watch here." (Point to the top of the cover).
f. Repeat test and prompt, as required. (Fade prompts).	
g. *Test* without prompts.	"You adjust the wick."
h. Reward or correct, as appropriate.	"Good, the wick is just above the cover."

There are several important features about this example. Note, that each time the teacher demonstrates the task or asks the student to demonstrate the task, she begins with the same phrase, "(I or You) adjust the wick." Note, also that the teacher uses exactly the same words each time the task is demonstrated, "When I turn this knob this way, the wick comes up." "Make the wick come this far above the cover." During initial teaching, it is important to use *brief* and *consistent instructions*. Later, after the student has learned to make the response, the instructions and other parts of the task may be varied to approximate more closely variations that are found in the natural environment. Getting, focussing and holding the student's attention during teaching are most important.

In the foregoing example, step 'd' directs the teacher to model the task as frequently as required. The teacher must use her knowledge of the student and the task to estimate how often the task must be demonstrated before the student learns the essential features. For some learners and tasks, a single demonstration may be enough. For more complex tasks or less skilled students, the task may have to be demonstrated several times.

Similarly, step 'f' of the example, directs the teacher to repeat the "test and prompt step" as often as required. During repeated trials, the prompts are faded from use. As a guideline, when a student can perform *rapidly, consistently and accurately*, with prompts, fade to less prompting. When responses are made rapidly, consistently and accurately with the least amount of prompting, introduce the test without prompting and correct or reward the response, as appropriate.

Attention. People cannot learn much by observing a model unless they focus attention on the *important* parts of the behavior being modeled (Bandura, 1977). Autistic, mentally retarded and learning disabled children have difficulties focussing on the important parts of a task (Brown, 1975; Lovaas, Schreibman, Koegel & Rehm, 1971; Ross, 1975; Wilhelm & Lovaas, 1976). However, once students who have mental retardation or learning disabilities do learn to focus on the important parts of a task, their performance approximates that of normal subjects (Berlyne, 1970; Ross, 1975; Wolfe & Cuvo, 1978).

The first steps in the "Attention, Model, Prompt and Test Method" involve getting and focussing the student's attention. In the previous example, the teacher says, "Nabu, (student's name) watch me." This *attention*

signal indicates *who* is to respond, Nabu (a particular student rather than the group) and *how* he or they are to respond, "*watch* (where?) *me*." A gestural prompt may also be used with the attention signal to *focus attention*. For example, if the teacher was going to speak, she may focus student attention by pointing to her mouth. Alternatively, if the teacher wanted to focus student attention on an object or picture, the following strategy could be used. Knowing that students usually look at the teacher's face when they are requested to look at her, she could hold the picture/object in front of her face, slightly below her eyes to focus student attention on the object/picture. In the example described above, Nabu's attention was drawn from the teacher's face to the wick adjusting knob when the teacher slowly moved her hand from in front of her face to the knob.

Getting, focussing and holding student attention during modeling is also important. During modeling, a student's attention may be focussed in several different ways. Attention may be focussed by using verbal and gestural prompts with the model. For example, when the teacher told Nabu, "When I turn the knob this way, the wick comes up. Make the wick come this far above the cover" several gestural prompts could be used to focus attention. While turning the knob "this way," the teacher could use a finger of her other hand to show the direction in which the knob was being turned. Also, the teacher could have pointed to the cover when she said, "The wick comes up" and again when she said, "This far above the cover."

Student attention may be focussed during a demonstration by *consistently* labelling important parts of the demonstration, such as the "knob," the "wick" and the "cover." Labelling of important parts of a demonstration tends to draw attention to those parts.

If a verbal rule is being modeled, extra words should be removed from the rule. For example, suppose the following rule about first-aid was being taught, "To remove germs and avoid infection, always clean a wound before putting on medication or covering." This rule is too long and complicated. Students may not focus their attention on the most important parts of the rule. Students may have difficulty remembering the entire rule in sequence. The rule may be easier to remember if it is shortened, for example, "Always wash wounds first." Student attention may be focussed on the important parts of the rule, when they are stated in a louder voice, for example, "Always *wash* wounds *first*."

Attention to an important part of a demonstration may also be increased through the use of *preteaching*. In a preteaching task, a student is required to focus attention on the same feature that will be important during the task that will be demonstrated later. For example, suppose a teacher wanted to teach students to discriminate mature from immature fruit on the basis of color. Suppose also that she knew from experience that the students would have difficulty focussing their attention on color because they would be distracted by the size and shape of the fruit and by the presence or absence of damage. The teacher could increase the likelihood the students would focus their attention on the color by intro-

ducing a suitable preteaching task. Before introducing the fruit, the teacher could have the students select color cards each of the same size and shape. In this simple, preteaching task, the cards can be selected only on the basis of color. Therefore, student attention is focussed only on color. Thus, when the fruit selection task is taught, the students are more likely to focus on color. They are less likely to be distracted by the shape, size and damage of the fruit.

Individualized instruction

Individualized instruction involves adapting instruction to best suit the learning style of an individual student. Some methods of individualizing instruction are described below.

a. As previously mentioned, the types of prompts, method and timing of fading, and the amount and type of rewards should be selected to suit the individual student.

b. The number of demonstrations given to a student before asking him or her to perform is based on the prediction that the student will make mistakes if asked to perform prematurely.

c. The amount of practice given to a student before beginning to teach a new task is determined by the number of trials required for a student to learn to perform the task rapidly, consistently and accurately.

d. When a student has learned to perform a task, the teacher may begin teaching a new task. However, the teacher should occasionally review the student's ability to perform the first task. The amount of time between each review should be slowly increased so that the student learns to remember how to perform the task for longer and longer periods of time. How long to wait between reviews is determined by the individual student's ability to remember how to perform the task from one review session to the next.

e. *Prosthetics* may also be used to individualize teaching. Prosthetics involve the replacement of an absent part of the body with an artificial substitute, or the improvement of a malfunctioning part with an artificial part. Prosthetic devices improve or make possible an act that a handicapped person would otherwise not be able to perform. Some common examples of prosthetic devices are: hearing aides, leg braces or calipers, glasses, specially designed spoons for eating, and braille symbols to help blind people read. Some less common examples of prosthetic devices are: picture books to help people remember and identify what to buy at the market, picture sequence charts that guide people with poor memories, or who are unable to read, to perform each of the steps in sequence when performing tasks (e.g., cooking food), a special vice or clamp to help a physically handicapped person hold an object while working, strips of wood nailed to the floor

to warn blind people they are approaching stairs. The creative use of prosthetic devices can permit people with various handicaps to perform many tasks they would have otherwise been unable to perform. Prosthetics are discussed by Smith and Neisworth (1975) and Bigge and O'Donnell (1976).

f. Sometimes when a student with a handicap would be unable to perform all of the steps in a task, a teacher may decide not to teach the task to the student. In *partial participation*, the handicapped person performs part of a task, someone else performs the other parts of the task. For example, a hearing impaired student and a visually impaired student can work together. One student can do the parts of the task requiring vision, the other student can do the parts of the task requiring hearing. Various combinations of handicapped and nonhandicapped people can work together. Partial participation permits people with handicaps to perform parts of complex tasks they would otherwise not have been taught. Partial participation can be used to make vocational placements for persons with handicaps.

g. Tasks may be individualized by teaching students different ways to perform the task. There is usually more than one way to perform a task. Sometimes unique ways of performing tasks can be invented. Some methods of performing tasks may be easier for people with particular handicaps. Changes can be made in the number, type and sequence of steps and in the equipment that is used. Individualizing or adapting tasks and teaching methods challenges a teacher's creativity. The results can be very rewarding.

Group Instruction

Because the literature on special education emphasizes the importance of individualizing instruction, one teacher to one student is often recommended. However, *individualized instruction*, instruction appropriate for a particular individual, can be achieved with one teacher to one student, in a small group or even in a large group (Payne, Polloway, Smith & Payne, 1981). Extensive research shows that for various types of students and tasks, group instruction may be more efficient and effective than *one-to-one instruction* (Polloway, Cronin & Patton, 1986). Several studies have shown that even students with severe handicaps can benefit from group instruction.

Reid and Favell (1984) conducted a major review of the use of group instruction with students having severe handicaps. Severely handicapped students are usually taught in groups of two to four students. These students may be taught sequentially. In *sequential instruction*, the teacher rotates from one student to another briefly teaching each student individually. The students in the group may be taught the same or different

skills. Alternatively, the teacher may use *concurrent instruction*. In concurrent instruction, all students are taught at the same time. Both sequential and concurrent instruction are more fully discussed below. Reid and Favell found that there was clearly sufficient evidence to indicate that, *in general*, group instruction can be an effective and efficient teaching strategy with students having severe handicaps. Eighty percent of all the studies reviewed reported improvements in the skills being taught as a result of group instruction (Reid & Favell, 1984). Some specific skills may be better taught in one-to-one instruction rather than in groups.

Polloway, Cronin and Patton, (1986) conducted a review of the use of group instruction with people ranging from severely and profoundly retarded children and adults to mildly handicapped students. Although sequential group instruction was most common with students having severe handicaps, concurrent instruction was more common with less handicapped students. Also, the size of the group being taught was usually larger among less handicapped students. Some of the advantages of group instruction for severe, moderate and mildly handicapped students are reported below.

a. Group instruction is more efficient and less expensive than one-to-one instruction. More students can be taught more effectively in the same period of time.

b. Various kinds of skills can often be learned as rapidly in groups as in a one-to-one situation. Greater *generalization* of learning is often achieved in group situations.

c. Group instruction promotes *observational learning*, students learn from observing the performance of other students.

d. Students in groups learn to wait until it is their turn to perform.

e. In a one-to-one teaching situation, if a student behaves inappropriately, the teacher must either attend to the inappropriate behavior and thereby possibly increase the behavior, or temporarily discontinue teaching and waste valuable time. In a group situation, when a student behaves inappropriately, the teacher can simply begin teaching or rewarding other students in the group. Ignoring the inappropriate behavior and attending to other students is likely to produce a reduction in the inappropriate behavior. When this approach is used, no teacher time is lost.

f. Group instruction often increases social behavior resulting in better integration of students with handicaps.

g. In *sequential group instruction*, where the teacher rotates from one student to another, briefly teaching each student individually, the *distributed* (or intermittent) *practice* of the skills being learned tends to improve the *maintenance* (durability) of the skills being learned.

h. In sequential group instruction where students in the group are taught different skills, *generalization* of learning may result. Students may learn the task being taught to other students in the group, *observational learning*.

Sequential instruction

In sequential group instruction, several students (two or more) are grouped close together. The students may be seated at desks in a semi-circle, around a table, or standing around the village well. Each student is taught independently for short periods. The teacher works briefly with one student then works briefly with another. During the total period of group instruction, the teacher will work several times with each student (Baine, 1986a).

Students in the group may be at the same or different levels of achievement. They may be taught the same or different skills. Each student may be treated entirely independently from the other students. Individualized methods of instruction may be used. Alternatively, the teacher may sometimes give general instructions or demonstrations at the same time to all students in the group before beginning sequential instruction. Usually, sequential methods of group instruction are more suitable to students functioning at a low level of performance (very young, inexperienced, severely handicapped, or multiply handicapped). Note, however, that even students with severe and multiple handicaps have been successfully taught with concurrent methods of instruction. These students may begin instruction with one-to-one methods, shift to sequential group instruction and finally, move to concurrent group instruction. Methods of making this shift are described below.

The benefits of sequential group instruction are listed below.

a. Each student receives *individualized instruction*. The skills taught and the methods of teaching used are selected to suit each individual student.

b. Each student receives several uninterrupted trials practicing the same task (*massed practice*). Practice of this type (for a suitable period of time) helps to establish new skills.

c. After a brief period of either a) inactivity, b) observation of other students being instructed, c) self-directed practice of a recently taught skill, or d) a self-directed entertaining activity, the student is again introduced to the previously taught skill. This is an example of *distributed practice*. Distributed practice makes a new skill more durable (students are less likely to forget skills taught by distributed practice).

d. During sequential instruction, students may be taught a variety of skills required for concurrent group instruction. For example, the students may be taught to sit side-by-side for long periods of time without interfering with each other. They may be taught to

focus more effectively on demonstrations and to listen to verbal instructions.

e. In sequential group instruction where students in the group are taught different skills, *generalization* of learning may result. Students may learn the tasks being taught to the other students in the group, *observational learning* (Baine, 1986a).

Suggestions for sequential instruction.

a. A teacher may begin with two students in the group and later expand to three, then four and up to six students.

b. Students may be taught to work with each other. For example, a hearing impaired student who is learning how to speak, may request a drink from a blind student who is learning how to pour liquids. Students taught to interact in this manner can briefly practice their newly learned skills while the teacher works with another student. Since the teacher is close to all of the students, guidance can be provided as required.

c. If a student is behaving inappropriately, other students in the group may be rewarded for acting properly. Thus, the student behaving appropriately may act as a model of good behavior for the other students to imitate.

d. Before the teacher moves from teaching one student to teaching another, it is important to give the first student enough *practice* to help him learn the relationship between the stimulus (the materials, demonstration or instruction presented) and the correct student response.

When moving from one student to another, the teacher should not leave any student without attention for too long. The teacher can decide how long to teach each student by looking at how long it takes the student to learn a task, how well the student is able to perform the task later when the teacher returns to the student, and how many behavior problems occur among students when they are not being taught. Sometimes a teacher can be teaching one student while occasionally giving rewards to other students for waiting, watching other students being taught, practicing what they were previously taught, or working on entertaining activities.

e. Before beginning sequential group instruction, the teacher should make sure he has all the materials required for each student. Also, in advance, the teaching method to be used with each student should be prepared and rehearsed. There is substantial research to demonstrate that a rapid and smooth change from one teaching task to another results in a lower error rate and fewer behavior problems (Carnine, 1976).

f. The teacher should begin with a small group of students and a simple task. Or, begin with two or three students working alone before putting them into a group of two, then three students (Baine, 1986a).

Concurrent instruction

In concurrent group instruction, several students (two or more) are grouped close together. The students may be seated at desks in a semi-circle, around a table, or standing at a village well. All students are taught by the teacher at the same time. This is the usual form of group instruction. Concurrent group instruction may be introduced in stages using the previously described methods.

Students within the group must all be at the same general level of achievement. The students must all be able to learn from the same methods of teaching. They must have relatively well developed language skills (verbal or manual) and they must be able to imitate a teacher's demonstration (Baine, 1986a).

The "attention, model, prompt and test teaching method" for group instruction

The previously described "Attention, Model, Prompt and Test Method" for one-to-one teaching can be used with minor modification for group instruction. The method can be used whenever students are to make a relatively brief, observable, verbal or motor response and where the teacher can provide all the assistance required to the whole group at one time rather than to particular students. The following example demonstrates use of the approach to teach a verbal response.

STEP	**EXAMPLE**
a. Get group *attention*:	"Everyone, listen to me."
b. Focus *attention*:	The teacher points to her mouth.
c. *Model* the task to be learned.	"Listen, I read these letters" ("a, m and s"): "aaa, mmm, sss."
d. Repeat the *model*, as required.	"Listen, I read these letters" ("a, m and s"): "aaa, mmm, sss."
e. *Test* and *prompt*.	"You read these letters" ("a, m and s").
(Use verbal, gestural, or physical prompts as required).	(USE A HAND SIGNAL). Gestural and verbal: the teacher touches each letter as it is to be read; as the teacher touches each letter, she reads the letter slightly before the students do (she *leads* the students' response).

f. Repeat test and prompt, as required. (Fade prompts).	
g. *Test* without prompts.	"You read these letters" ("a, m and s"). (USE A HAND SIGNAL)
h. Reward or correct, as appropriate.	"Good, you are reading."

Note, the teacher uses a *hand signal* each time the students are to answer. The *hand signal* is used in the following manner.

a. The hand signal is given at the same time as the teacher says, "You read these letters."
b. When the teacher says "You," she reaches her arm toward the students with the palm of her hand facing them. Her hand is held there briefly until she has the attention of all students.
c. As she says "read these letters," she moves her hand toward her shoulder. This is a signal for the students to get ready to respond. Her hand pauses at her shoulder long enough for the students to prepare to respond.
d. When the teacher thinks that the slowest student in the group has time to prepare the response, she touches each of the letters. The students have previously been taught not to respond until the teacher touches each letter. All of the students answer at the same time.

When this approach to teaching is first used, students have to practice repeatedly answering at the same time as the hand signal is made. When all students answer at *exactly the same time*, slow students cannot copy faster students. Therefore, to give the correct answer, all students have to *learn* the correct answer. They cannot simply copy the response given by other students.

When all students answer at the same time, if one student makes a mistake, the skilled teacher (it takes practice) will hear the mistake and will correct it. *The teacher does not directly correct the student who made the mistake.* If the teacher did give attention to the student who made the mistake, the student *may be taught to make mistakes to get the teacher's attention.* Most students like teacher attention and may make mistakes to get that attention. Instead, the teacher corrects the wrong answer by reteaching the whole group. The teacher *models* the correct response, again *leads* the group response (as often as required to get a rapid, accurate and consistent response), then *tests* the *group.* Alternatively, if the teacher is *quite certain* a particular student will answer correctly, the teacher may have that student model the correct response to the group. With this method, only students who model appropriate behavior get teacher attention (Baine, 1986a).

Every time the teacher asks the group to answer a question, all students in the group get practice giving the correct answer. If the group is

carefully taught, all students will get practice making the correct response several times. Alternatively, in other approaches to teaching, when students are allowed to *guess* the correct answer or work on their own, students having difficulty often repeatedly practice giving the wrong answer. To avoid these problems, teachers should not permit students to guess answers or work alone unless the students can make the correct response (Baine, 1986a).

Usually group instruction using this approach lasts for 10 to 15 minutes. In the beginning, teachers may start with shorter periods of time and fewer students. The advantages of this approach to teaching are listed below.

a. The same "Attention, Model, Prompt and Test Method" is used in both one-to-one and group instruction. This consistency of approach helps students move from individual to group instruction.

b. The approach is designed to end *guessing*. When students do not know the answer, they may guess the wrong answer. When students guess the wrong answer (model the wrong answer to other students), they increase the likelihood the wrong answer will be given the next time the question is asked. The more difficult the question, the more wrong answers may be guessed (and modeled). To stop guessing, the *teacher models* the correct answer before asking students to answer the question.

c. The approach is designed to reduce mistakes and increase the amount of practice students get making the correct response. The teacher models the correct response several times. The teacher then repeatedly prompts (helps) the students to make the correct response. The teacher continues to help the students respond until they can respond rapidly, consistently and accurately.

d. Students are not asked to respond individually until the teacher is quite certain the students can individually give the correct answer. Students repeatedly practice giving the correct answer along with the group before they are asked to answer the question alone.

e. When the teacher is quite certain the weakest student in the group knows the correct answer, these students may be individually tested. When the weakest student makes the correct response, the teacher knows it is time to teach a new task to the whole group. This student is given a big reward for making the correct response. Thus, rather than give weak students attention for giving wrong answers, the teacher gives big rewards for correct answers.

f. Variations of this teaching method have been used successfully with a broad variety of students and tasks (e.g., Becker & Carnine, 1980 [review of methods and research] Carnine &

Silbert, 1979 [reading] Dixon & Engelmann, 1979 [spelling] Engelmann, 1980 [general methods] Engelmann & Bruner, 1983 [reading] Gersten, Woodward & Darch, 1986 [review of issues and research] Silbert, Carnine & Stein, 1981 [mathematics]).

Additional examples of use of the "Attention, Model, Prompt and Test" technique can be found in Baine (1986b), *Testing and teaching handicapped children and youth in Developing Countries*. This teacher's manual is available free-of-charge from UNESCO, Paris.

Designing a Teaching Sequence

Listed below are the steps a teacher would take to develop a teaching sequence. The discussion that follows provides a review of many of the topics described in this chapter and in previous chapters.

a. Define the teaching goal(s).
b. Write an instructional objective(s).
c. Do a performance analysis.
d. Select the type of reinforcers to be used.
e. Prepare the teaching materials required.
f. Prepare the teacher scripts.
g. Teach and evaluate the teaching sequence.
h. Revise the sequence if required.

Define the teaching goal

In the example that follows, the goal the teacher has selected for a group of five students in a vocational training program is:

"to teach the students how to build an artificial leg for persons who have had an amputation below the knee."

Write an instructional objective

The instructional objective and the performance analysis are actually done at the same time. The conditions and standards described in the objective relate to each step in the performance analysis. For example, standards of performance are written for each step listed in the performance analysis.

Given: *Conditions*:

- a length of bamboo, 4-6cm wide; the bamboo should be a little longer than the good leg from the knee to the heel;
- a long knife or machete;
- a hammer or wooden mallet;
- a saw;
- strong, thin wire, at least 150cm long;
- a tool to use as pliers and a wire cutter;
- a large pot of wood glue;
- a stick or spatula to apply the glue;

- five handfuls of sawdust;
- at least five rolls of gauze bandage;
- four sheets of sandpaper: three gross and one medium fine;
- a vice to hold the work; and
- an amputated leg to fit (real or simulated).

Performance: the students will make an artificial leg to the following

Standards:

- the bamboo strips must be between 7-10mm in width;
- the soft inner layer of bamboo must be removed from all of the bamboo strips to a depth of 20cm;
- the plaster cast must be inserted between the bamboo strips to a depth of 1cm;
- the plaster socket must not be cracked, damaged or misshapen during insertion....

One or more standards are written for each step in the following performance analysis. When this has been done, the teacher can use the instructional objective as a test to judge each step of the student's performance.

Do a performance analysis

The following performance analysis was taken, with minor modifications, from Werner's excellent book, *Disabled Village Children* (1987).

a. Collect the materials required:
   - a length of bamboo, 4-6cm wide; the bamboo should be a little longer than the good leg from the knee to the heel;
   - a long knife or machete;
   - a hammer or wooden mallet;
   - a saw;
   - strong, thin wire, at least 150cm long;
   - a tool to use as pliers and a wire cutter;
   - a large pot of wood glue;
   - a stick or spatula to apply the glue;
   - five handfuls of sawdust;
   - at least five rolls of gauze bandage; and
   - four sheets of sand paper: three gross and one medium fine.

b. Use the mallet and the machete to split the bamboo from the top to a little below the level of the end of the stump. The bamboo should be split into strips of about 7mm or 3/4cm each.

c. Remove the soft inner layer of bamboo from each of the thin strips.

d. Insert the plaster socket made of the person's amputated leg between the bamboo strips. (The plaster socket was prepared in earlier lessons).

e. Repeatedly wrap the wire around the bamboo strips to firmly fix the plaster socket between the bamboo strips.

f. Put the limb on the person's stump and have him stand on it. The person should be wearing the special stocking on the stump (prepared in earlier lessons) and a shoe or sandal on the "good" foot if usually worn.

g. Make sure the post is straight or at the same angle as the "good" leg. If the post is not at the correct angle, loosen the wire and re-adjust until it is the same.

h. Check the length of the post. If necessary, cut the post until it is the same length as the "good" leg.

i. Trim the tops of the bamboo strips.

j. Use the spatula to spread a layer of glue around the outside of the bamboo strips and the plaster socket.

k. Press sawdust into the glue.

l. Tightly wrap gauze bandage around the entire, glued surface.

m. Repeat steps j, k and l 5 or 16 times.

n. Use the sandpaper to smooth the outside of the socket and the inner edges of the top of the bamboo strips.

Prepare the teaching materials required

If the teacher is going to model each step of the sequence and he expects the students to imitate the model at the same time, one set of each of the previously described materials and tools will be required for each of the five students. If necessary, some of the equipment, such as the glue pot and the saw could be shared. The more equipment that is shared, however, the more students will be standing around waiting and the slower teaching will be.

The teacher will require at least one person to be fitted for an artificial leg. Alternatively, the teacher can use a simulated amputation. The teacher could prepare a post to represent the "good" leg, and an "amputated" post wearing a special stocking to represent the leg with a stump. A fixed "knee" could be mounted toward the end of the amputated leg. These posts could be joined at the "hip" so that they stood in the same manner as a person with one leg amputated below the knee.

In addition, the teacher will need a vice or some other device to hold the bamboo post in an upright position while it is being cut into strips, when the plaster socket is being inserted and when the wire, glue and sawdust are being applied. Rags and a solvent will be required for cleaning up glue. All material must be organized in advance.

Prepare the teacher scripts

In the example that follows, the "Attention, Model, Prompt and Test Method" is being used to teach step 'e' in the performance analysis.

e. "Repeatedly wrap the wire around the bamboo strips to firmly fix the plaster socket between the bamboo strips."

STEP	EXAMPLE
a. Get group *attention*:	"Watch this."
b. Focus *attention*:	The teacher holds up the wire and moves her hand toward the bamboo strips on the top of the bamboo post.
c. *Model* the task to be learned.	"Watch, I tie the socket into the strips." With the bamboo post held upright in the vice, the teacher says, – "To hold the end of the wire, loop the wire once around this strip." – "Pull it tight and leave a 'tail' this long (8-10cm)." – "Hold this strip (the one with the looped wire) and pull the wire tightly FIVE times around the bamboo strips and the plaster socket." – "Remove any looseness from the wires like this." – "Now, twist this end of the wire to the 'tail'." – "Firmly hold the bamboo post, put your hand inside the socket, and try to move the cast without moving the post." "If the socket moves, rewire it."
d. Repeat the *model*, as required.	
e. *Test* and *prompt*.	
(Use verbal, gestural, or physical prompts as required).	"You tie the socket into the strips."

For example: when the wire is being wrapped around the first strip, the teacher may remind the students, "Make sure it is *tight*." She may point to her own model and say, "Watch, the tail must be this long."

f. Repeat test and prompt, as required. (Fade prompts).	
g. *Test* without prompts.	"You tie the socket into the strips."
h. Reward or correct,	

Example of a correction:

When the students were not removing all of the looseness from the wire the teacher corrected them. She said, "Stop! *All* of the *looseness* must be *removed* like this." She then *modeled* how to remove *all* of the slack. She then *tested* the students and gave them verbal, gestural and/or physical *prompts* as required. Then, she said, "Now do it without help."

To correct a student, the teacher MODELs the task again, TESTs and PROMPTs the students as often as required, then TESTs the students without prompts.

Example of verbal rewards (*descriptive praise*).

"Good, the tail is long enough."

"Well done, the wire is tight."

"The cast won't move, good job."

""I think you are almost ready to graduate."

The IMPACT system of mass primary education (Socrates, 1983) designed for use in the Philippines provides an excellent example of the use of behavioral objectives, task analysis, scripted teaching, and peer teaching.

Chapter Six

Methods for Teaching Handicapped Students in Large, Regular Classrooms

The goals of this chapter are as follows.

a. Review the methods and benefits of student tutoring, cross-age tutoring, peer tutoring, tutoring of normal functioning students by students with handicaps, and ripple tutoring.
b. Review the methods and benefits of using parents, community volunteers or paid people with specialized skills as teaching aides.
c. Discuss methods of designing suitable aide and tutor programs.
d. Describe methods of training student tutors and aides.
e. Provide a review of sample tutor programs and tutor teaching scripts.
f. Discuss the nature, use, advantages and disadvantages of the buddy system, learning centers, itinerant consultants, creative scheduling, and methods of giving assignments.

Whether on the basis of a philosophy of education, or simple economics, many handicapped students in Developing Countries have been *"mainstreamed"* into regular education programs. Students with handicaps have been placed in regular education classrooms. Usually, the number of regular education students in these classrooms is quite large. Under these conditions, it is very difficult to provide individualized or even small group instruction. In the discussion that follows, suggestions are made for attempting to teach students with special needs in large, regular classrooms.

Student Tutoring

Student tutoring generally refers to the situation in which one student offers academic assistance to another student on a one-to-one basis. Tutoring may be *cross-age* in which older students instruct younger students, or *peer tutoring* in which students of the same age are instructed. Usually, cross-age tutoring is the most effective method of tutoring academic content (Osguthorpe, 1984). However, if the primary goal of tutoring is to improve social acceptance of handicapped students, peer tutoring may be more effective than cross-age tutoring (Osguthorpe, 1984). Usually the tutor, average or above average in ability, teaches a student of equal or lower ability. However, Osguthorpe and Scruggs (1986) made an exten-

sive review of the literature in which students with handicaps were used as tutors. Research has shown that *properly trained* and *supervised,* handicapped and remedial students can be used to tutor *appropriately selected* peers and younger students in a variety of content areas.

Research also indicates that academic and personal/social gains are made by both handicapped tutors and the students they tutor. Teachers and other observers have noted that tutors often appear to gain as much benefit or more than the students they tutor. Social benefits, such as improved self-confidence, self-esteem, attitude toward school and responsibility as well as academic benefits have been reported (Allen, 1976; Jenkins & Jenkins, 1982). Most researchers in the area believe that students with handicaps may learn more about a topic by teaching it to someone else than they would if they were to learn it from a teacher or a textbook (Mellberg, 1980; Osguthorpe, 1984; Scruggs, 1985).

Studies have been reported in which student tutors were used to teach improved sight word recognition, sign language, math skills, personal-social skills, spelling, phonetic analysis, word meaning, and language arts (Osguthorpe & Scruggs, 1986).

Learning disabled and educable mentally retarded students can be as effective as nonhandicapped students in the role of tutor (Mellberg, 1980). In fact, in one study in which young retarded students were tutored by either graduate students, average students in the fourth year of school or retarded students, no significant difference was found in the amount learned regardless of the type of tutors used. The *tutees* learned as much from mentally retarded tutors as they did from adult, special education, graduate students (Lombardo, 1976). In the majority of studies, positive tutoring results have occurred after as little as 10 hours of tutor-tutee contact over a seven-week period.

The main considerations a teacher must make when deciding whether or not to use student tutors are a) the specific needs of both tutors and tutees, b) the time and effort required to train tutors, and c) the time and effort required for the actual tutoring—in essence, the cost-effectiveness of the procedure in a specific situation. The needs of both the tutor and the tutee must be considered.

Ripple Tutoring

Ripple tutoring occurs when a few handicapped students are trained to tutor each other, then the number of tutors is gradually expanded when the tutors train additional handicapped students to act as tutors. For example, four students with learning disabilities (LD) are trained to tutor four students with behavioral handicaps (BH). The LD students then train the BH students to act as tutors. Then there are eight tutors who begin tutoring eight other students who will then become tutors. The number of tutors expands quite rapidly (Osguthorpe, 1984).

Teaching Aides

Teaching aides may include parents, community volunteers or people with specialized skills who are paid or unpaid volunteers. Miles (1985) reported that in Hyderabad, India, the need for extra help and a more favorable teacher/pupil ratio has been tackled by a remarkable and imaginative involvement of the local community. At a school for 130 students, among whom 22 were mentally retarded, the efforts of the five teachers were supplemented by more than 100 volunteers, each of whom gave 1-2 hours assistance per week.

Teaching aides should be taught exactly what to do, when, where, with whom, and how to do it. In the beginning, aides need careful instruction and close supervision. They should be trained before they start to work with students. Before they begin teaching, aides should be given ample time (e.g., one full day) for observation and the opportunity to ask questions. Initial training should be conducted when there are no students present. Aides should be taught how to fulfill all the requirements listed in the following Checklist for Classroom Helpers adapted from Paine, Radicchi, Rosellini, Deutchman & Darch, 1983.

Checklist for Classroom Helpers

	Mon	Tue	Wed	Thu	Fri
a. arrives on time	.	.	.	.	.
b. comes in quietly	.	.	.	.	.
c. gets all needed materials	.	.	.	.	.
d. works in correct place	.	.	.	.	.
e. does the assigned activity	.	.	.	.	.
f. works with the correct students	.	.	.	.	.
g. does the activity properly	.	.	.	.	.
h. finishes at the right time	.	.	.	.	.
i. puts all materials away	.	.	.	.	.
j. leaves quietly	.	.	.	.	.
k. handles problems effectively	.	.	.	.	.
l. is encouraging, positive and supportive with students	.	.	.	.	.
m. teaches at an appropriate speed neither too fast nor too slow	.	.	.	.	.
n. enforces classroom rules	.	.	.	.	.
o. communicates clearly	.	.	.	.	.
p. seeks help, when and if required	.	.	.	.	.

This checklist can be given to the aides during their training. The checklist describes the teacher's expectations, and can be used by the aides to guide and evaluate their own work. Teachers may use the check-

list to evaluate the aides' work, to provide feedback and guidance, and to reward the aides. Initially, the checklist may be evaluated daily, then weekly, monthly and finally, as the aides become skilled, it may be eliminated from use. Teachers should be direct and firm when giving instructions to aides. They should also be enthusiastic, positive and encouraging when rewarding the aides for their assistance.

The following considerations should be made when a program is being established for student tutors or teaching aides.

a. What are the goals of the program? What benefits do you expect for the aides, tutors and students being assisted?
b. What specific skills will be taught?
c. Who should the tutors or aides be? Who can provide the best assistance and make the greatest gain?
d. When, how and for how long should aide or tutor training take place?
e. What materials and/or equipment will be required?
f. How and when will the aides or tutors be monitored and how and when will feedback be provided?
g. For how long, how frequently and where will tutoring take place?
h. What tutoring/teaching methods will be used, e.g., the "Attention, Model, Prompt and Test Method"?
i. How should the tutor respond to correct or incorrect behaviors?
j. What problems are most likely to arise with the aide, the tutor, the student, the teaching methods, with behavior management, etc., and how should these problems be handled?

The following sample tutor programs have been modified from Ehly and Larsen (1980).

Sample Tutor Program

A. Overall goal: the student will use initial consonant sounds to decode unfamiliar words.

Specific goals: describes the sequence of tasks the tutor will teach the tutee.

a. Given a series of letters, the student will name each letter and give its sound.
b. Given a series of words beginning with a consonant letter, the student will name the initial consonant.
c. Given a series of *familiar* words, the student will name the initial consonant and its sound.
d. Given a series of letters, the student will name words from his/her reading vocabulary that begin with that consonant.

e. Given a consonant letter to be placed at the beginning of familiar phonetic patterns, such as "at, an" and "in," the student correctly reads the newly formed word aloud:

bat fat cat bin tin

B. General goal: the student will demonstrate the basic addition facts for whole numbers with sums from 1-20.

Specific goals: describes the sequence of tasks the tutor will teach the tutee.

a. When shown randomly any number from 1-20, the student will state the name of the number e.g., 15 = _____; 9 = ____.

b. When given randomly the name of any whole number from 1-20, the student will write the number.

c. When given random flashcards of basic addition problems with sums from 1-20, the student will state the answer to each problem, e.g.,

$$\begin{array}{r} 5 \\ +6 \end{array} \qquad \begin{array}{r} 7 \\ +8 \end{array} \qquad \begin{array}{r} 2 \\ +1 \end{array} \qquad 7 + 3 = ____ \qquad 5 + 7 = ____$$

C. General goal: the student will complete math assignments independently within the assigned class time.

Specific goals: describes the sequence of tasks the tutor will teach the tutee.

a. The student will solve five math problems during the tutoring session with the tutor's help.

b. Given five math problems, the student will solve each problem independently while the tutor stays with the student.

c. The student will complete five math problems independently within 15 minutes while sitting alone at his desk.

Sample Tutoring/Teaching Script

The teaching script described below has been used to teach phonetically irregular words to children ages 8-10 years old who were behind two years or more in spelling achievement. The script was used by a teacher (tutor) and by the students themselves (Bain, 1983). The script describes, in sequence, exactly what the tutor is to do and say at each step of instruction. The script also describes what to do when an error occurs. Once a script like this has been prepared, it can be used repeatedly by various teachers (tutors) with a variety of students.

During instruction, each word that was being learned was printed in 1cm high, red letters on a strip of card 4cm wide. The strip of card could be moved in and out of a cardboard sleeve to reveal one or more letters or the entire word at one time. In the description that follows, instructions

to the teacher are printed within parentheses, and teacher dialogue is printed within quotation marks.

a. (Pull the word from the sleeve).

b. "Look at this word." (Point to the bottom of the first letter).

c. "This word is ... ." (Slide finger along bottom of word while reading the word).

d. "Say it with me, when my finger moves along. Ready, ..." (Slide finger along bottom of word).

e. "What word? ... ." (Slide finger along bottom of word).

f. "I can look at the letters and spell this word aloud. My turn .. .." (Successively touch the bottom of each letter as the letter name is spelled).

g. "Spell it with me when I touch each letter .. .." (Successively touch the bottom of each letter while spelling the letters with the child).

h. "What word? ... ."

i. "When I touch the letter you spell ... ."

j. "What word? ... ."

k. "Now you are going to write the word ... ." (Put the word into the cover).

l. "Write the first letter in ... ."

m. (Slide the first letter from the cover. "Look at the first red letter." (Touch the first red letter). "What is the first red letter? ... ." "What is the letter you wrote?"

n. "Are they the same? ... ."

(If the letters are the same, pull the whole word out and advance to step o.)

o. "When I touch the letters you spell ... ."

p. (Put word back into cover).

q. "Turn to a clean page."

r. "What word are you spelling? ... ."

s. Print the first 2, 3, (as appropriate) ... letters in ... ."

t. (Slide the letters out of the cover one at a time).

u. "Say the letter you wrote."

v. "Are they the same? ... ."

(If the letters are the same, return to step o and repeat).

(If the letters are different, pull the whole word out and advance to step a.1.)

a.1. "Look at this word. What is the word?"

b. "When I touch the letters you spell them .. .."

(Touch the bottom of each successive letter).

c. "What word?"

d. (Repeat steps b. and c. twice).

e. "What word? ... ."

f. "Turn to a clean page."

g. "Print the letters you got right before, and add the correct letter."

h. (Slide the letters out one at a time).

i. "Say the red letter ... ."

j. "Say the letter you wrote ... ."

k. "Are they the same?" (If they are the same, return to step 'o' above. If they are different, return to step a.1. above).

Training Tutors/Aides

Tutors and aides are usually trained in the following manner.

a. *Modeling.* First, the teacher demonstrates how the tutor/aide should teach the student. *Role playing* is used. The teacher plays the role of the tutor/aide; the tutor/aide plays the role of the student. The teacher demonstrates every word and action the tutor/aide should make. The teacher demonstrates how to help a student who needs aid, how to correct the student when errors occur, and how to reward the student who performs correctly. When the task being taught to the tutor/aide is long and/or complex, the teacher may divide the task into parts. The tutor/aide will be taught to imitate each part in sequence. Then, the tutor/aide will be taught to imitate all of the segments in order.

   In general, tutor/aides are taught to use the "Attention, Model, Prompt and Test Method" of teaching.
   - Attention: the tutor/aide gets the student's attention.
   - Model: the tutor/aide demonstrates what she wants the student to do.
   - Prompt: the tutor/aide prompts (helps) the student, as required, to perform the task. As discussed in other sections of this book, verbal, gestural, modeling and physical prompts may be used. Usually, the tutor/aide will simply redemonstrate the task.
   - Test: the tutor/aide asks the student to perform the task without assistance. The tutor/aide provides correction or reward depending on the nature of the student's performance.

b. *Role reversal.* Following the demonstration of the teaching methods by the teacher, the tutor/aide and teacher reverse roles. The tutor/aide teaches the task to the teacher. During this "test"

period, the teacher will make errors that are commonly made by students. By making errors, the teacher tests the ability of the tutor/aide to correct the errors properly. The teacher provides correction and reward as required. When the tutor/aide has successfully demonstrated teaching the teacher, the tutor/aide is ready, with supervision, to teach a student. If students with handicaps are being trained to teach normal functioning students, the handicapped students may be given practice teaching other handicapped tutors before they begin to tutor the normal functioning students.

c. *Supervised teaching.* The teacher should not expect tutors to have total mastery of the tutoring role during the first week of tutoring. Even though tutors may become skilled at role playing the part of tutor with each other during the training sessions, they must still become familiar with the new situation of tutoring an unfamiliar student (Osguthorpe, 1984). Handicapped, tutor/aides may require considerable supervision during the first one or two weeks. This supervision may be provided by other aides, volunteer parents, or by scheduling two or more pairs of tutor/aide-students during a time when it will be convenient for the teacher to provide supervision.

The Buddy System

Students with hearing handicaps may be assigned a "buddy" or "assistant" to help them. This carefully selected person can take notes, answer questions and further guide the student with limited hearing. Care should be taken to insure that the student with limited hearing is not being given more help than is required. Because students with impaired hearing cannot read speech and take notes at the same time, it may be helpful if the buddy shares carbon copies of his notes. Care should be taken to select a student who writes clearly and who takes good notes.

For students with visual impairments, the buddy can copy material in large print, describe events that are happening and read to the student when required. The buddy may also read notes onto a tape recorder to be listened to in future.

Students with limited sight or hearing should be as independent as possible. Also, their buddies should not be overly distracted from their own work.

Learning Centres

A learning centre is a reserved space in the classroom where students may go to work on an independent, guided, learning activity. A well designed learning centre provides the student with a) space to work, b) all of the equipment and materials required, c) instructions describing what do and how to do it, d) a checklist for evaluating work, e) answer sheets, f) forms for recording performance, and g) a guide for correcting work. In a learn-

ing centre, students may review, apply, and/or generalize skills and/or concepts recently taught in the classroom. Learning centres may be used during the acquisition, maintenance and/or generalization phases of instruction. A learning centre provides a teacher with an opportunity to *individualize instruction* through repetition of instructions, and/or provide additional practice or examples as required by particular students. A learning centre may be used following a lesson, as an alternative to assignments given to other students in the classroom or as an enrichment activity.

Printed, pictorial and/or tape recorded directions may be used at the learning centre to tell/show the student exactly what to do. Instructions may be printed on 7.5 x 12.5cm cards or on wall charts. Alternatively, student assistants may be assigned to the learning stations on a rotating basis to give instructions and/or demonstrations to other students.

Learning centres should be designed so that one or more students may be involved at one time and so that various students may use the centre at different times with little or no maintenance from the teacher. Sufficient worksheets and other materials should be prepared in advance. Students should be given instructions to return the learning centre to its original condition following use.

Students with short attention spans may be assigned to a learning centre for 10, 15 or 20 minutes depending upon their ability and the nature of the activity. Alternatively, these students may be assigned to the centre for longer periods during which they participate in a variety of short activities.

Itinerant Consultants

Itinerant consultants are people with specialized skills for working with students having auditory, visual, physical or other specific types of handicaps. The consultants travel from school to school assisting teachers in methods of assessment, instruction, materials preparation and equipment building. The consultant may focus on helping the teacher, and may also provide direct help to a student. An itinerant teacher can diagnose the problems of a student and on the basis of the diagnosis design a remedial program. The itinerant teacher may work with one student at a time or with a small groups of students. When the itinerant specialist identifies the basic problems of a student, she develops an educational strategy and gives the educational program to the classroom teacher. A blind student, enrolled in a regular classroom, could be taken out for short periods by the itinerant teacher for mobility, orientation and braille training. The main role of the itinerant is to develop instructional materials and lessons, and supplement the program being used by other students. It is also the itinerant specialist's responsibility to maintain equipment (Abang, 1982).

Adeyoyin and Igbokwe (1978) reported that in Nigeria the number of specialist teachers is usually insufficient. The distance between schools is often too great and roads leading to the schools are often inaccessible and impassable in the rainy season. In addition, the means of transport are in-

adequate, and teachers who have to travel by bicycle or public transport cannot reach their schools in bad weather.

Gopalan (1986) described an itinerant consultant program in India. With the spread of integrated education, there had been a demand for *resource* teachers. The itinerant personnel belonged to a special agency and were on loan to regular schools. They were thus accessible to a large number of children. Initially, they gave direct service to children, but at the same time made efforts to locate other staff members, parents, family members or peers who were willing to learn the techniques necessary to help the disabled student. The resource consultants made themselves available on a regular basis to school personnel and family members to share knowledge and skills, jointly work out strategies for action and evaluate programs. This was done individually, in small groups or in a workshop format.

In 1975, a survey was conducted in Nigeria of the effectiveness of integrating blind students who lived at home and attended the ordinary primary school nearest to their homes. Each child was placed in a regular classroom according to age and/or ability. Each student was visited by a specialist, itinerant teacher of the blind and given individual teaching in a corner of the classroom, along the corridor or, in very few cases, in a specially provided resource room. When the itinerant teacher was not visiting, the blind student remained in the classroom participating orally in the lessons taught by the regular classroom teacher. The frequency of such visits by the specialist, itinerant teacher depended on the number of children she had to visit, the distance between the schools, means of transport, accessibility by roads and the enthusiasm of the itinerant teacher. The survey found that 80% of the blind children integrated into ordinary primary schools were going through 6-8 years of primary education being socially integrated, but not achieving academically. The lack of academic achievement was attributed to the irregularity of visits and specialized teaching since visits ranged from one a week to one a term for the majority of students (Ogbue, 1975).

In contrast, a study in Indonesia (Department of Research and Development, Ministry of Education and Culture, Republic of Indonesia and Helen Keller International, 1983) found that visually handicapped children could function successfully in regular primary schools with the support of a special education teacher. The evaluation revealed that the visually handicapped students were highly motivated, that 53% of the visually handicapped students ranked in the top 10% and that 28.5% ranked in the second 10% level of their classmates.

The Nigerian study, (Ogbue, 1975), found that at the post-primary education level, blind, deaf and orthopaedically and health handicapped students competed with normal students in States and National Common Entrance Examinations for admission into post-primary institutions of their choice. Such students were being randomly integrated into secondary grammar school, trade/craft centres, technical colleges and teacher training colleges, while a small number had gone to universities.

Creative Scheduling

Several scheduling arrangements may make it possible for teachers to provide occasional, individual or small group instruction to students having special needs. Two or more teachers can arrange to combine their students for some activities requiring little supervision. For example, one teacher may take most of the students from two classrooms, while the other teacher may provide special instruction to the remaining students.

Rather than schedule activities during successive periods of time, a teacher may schedule them at the same time. For example, rather than schedule one activity (e.g., reading) during the first half-hour and another activity (e.g., crafts) during the second half-hour, both activities could be scheduled during the same one-hour period. During this period, most of the students can be assigned work requiring little supervision (e.g., crafts). The remaining students can be given individual or small group instruction in, for example, reading, for a short period of time. During the one-hour period, all students would have the opportunity to participate in both activities for various periods of time depending upon their needs.

When students in two or more classrooms require specialized instruction, time and effort may be saved when each teacher agrees to prepare and deliver a specialized training package for each type of problem. For example, rather than have each teacher prepare and deliver instruction for each of the three types of special problems that may exist in each of their classrooms, each teacher could provide one type of remedial instruction for all of the students having the same problems in each of the classrooms.

Once trained to teach specific skills, aides or tutors, rather than stay in one classroom, could be shared by several teachers. This approach reduces training time and redundancy.

Methods for Giving Assignments

a. Give instructions in short, direct sentences.

b. List the instructions in order on the board.

c. Give a short handout to students. The handout may list various assignments for a variety of students at various times of the day. For any one period, student or group of students, simply refer to specific items in the handout, for example, "Kastiri, Agit and Gopaw, during the next half-hour, do items 5, 6, 9, 11 and 13." This approach permits some *individualization* of assignments, while students work on different but related material, or work on the same material but do different amounts of work in a fixed time period.

d. Study guides and worksheets can be given to students to accompany textbooks.

e. When students are assigned work to do independently, a list of the correct answers should also be made available as each part of the assignment is done. With this information, students can quickly identify when they are experiencing difficulty and can seek help. When students are given independent assignments and when the accuracy of their work is not monitored, students with the greatest need for assistance will receive the greatest amount of practice doing the assignment incorrectly. Frequent self- or teacher-monitoring of the accuracy of student work and assistance when and as required is important.

f. Leaving a permanent model of the method of solving an arithmetic problem, following demonstration of the method of solution, can be effective. a) The teacher demonstrates how to solve a particular type of arithmetic problem. b) The teacher describes aloud his thinking and actions at each step. c) The student is given a worksheet of problems of the same type. d) At the top of the student's worksheet is an example of the method used to solve that type of problem. The combination of demonstrating how to solve the problem, how to think and act as the problem is being solved, and providing a solved example problem was more effective than any one of these three procedures used alone (Smith & Lovitt, 1975).

Chapter Seven

Teaching Students with Limited Hearing

The goals of this chapter are as follows.

a. Review a number of common symptoms of hearing impairment indicating the need for referral to a specialist.

b. Discuss a number of general methods for improving communication with students having limited hearing.

c. Describe various methods for diagnosing and adjusting hearing aids.

d. Describe step-by-step methods for testing a student's ability to hear common speech sounds under ideal conditions.

e. Describe step-by-step methods for finding the most effective methods of communicating with hearing handicapped students in typical teaching conditions.

Most people with hearing impairments have enough usable hearing (*residual hearing*) to learn to understand and produce speech (Hammerman, 1981). Teachers should use these listening skills and train students to improve them. In the discussion that follows, a number of suggestions are made for working with and improving each student's usable hearing. A number of related references are reported at the end of the chapter.

General Recommendations

When to make a referral

Students who often show one or more of the following symptoms should be sent to a doctor or a hearing specialist.

a. Often fails to respond to speech or common sounds that other students in the classroom easily respond to.

b. Often responds to sounds only after someone touches him or her or points to the source of the sound.

c. Often responds to sounds by turning in the wrong direction.

d. Often attends only to part of a spoken message.

e. Often responds to sounds by holding head to the side, leaning forward, looking intently at the speaker's mouth, and/or holding hand to his or her ear to "catch the sound."

f. Often confuses words with the following sounds: "s, sh, ch, t, d, th, v, p and f."

g. When speaking, often says "s, sh, ch, t, d, th, v, p and/or f" sounds in an unusual manner.

h. Often speaks with an unusually soft, loud or monotonous voice.

i. Often turns radios and other similar devices to a loud volume.

j. Often asks for repetition or explanation of spoken instructions.

k. Often listens for only a short period of time.

l. Often has earaches, fluid running from the ear(s), sore throat, cough, and/or breathes through mouth.

m. Often loses balance for no apparent reason.

Communicating effectively

Several general suggestions of methods for improving communication with students having hearing impairments are listed below.

a. When talking to a student with a hearing impairment *do not* speak louder than usual. *Do not* use single words or short phrases rather than full sentences. *Do not* move your lips unnaturally to show the person the sounds you are making. *Do not* distort the sounds of words by trying to emphasize each sound, e.g., "book" = "BB-oooo-KK."

   Do speak in your normal manner, at a moderate speed. As some hearing impaired students may have delayed language development, it may be useful to use simple sentence structure and common words. When speaking English, it may be helpful to imitate the style of speech used in the "Special English," Voice of America broadcasts on short-wave radio. Note the speed and rhythm of the speech, and the manner in which the speaker pauses very briefly between phrases, emphasizes key words, and says all of the sounds within each word without distorting the word. Ask another teacher to listen to your speech, watch your mouth and tell you if either is distorted.

b. To help a student with limited hearing understand speech and gestures, a teacher should stand so that light falls upon his or her face and upper body. The face and upper body should be free from shadows. Teachers should avoid standing between a student and a light source such as a bright window.

c. While speaking, a teacher should stand in one place, close to and facing the student. Teachers should not face the blackboard while speaking.

d. Before giving instructions or a demonstration, a teacher should make sure the student is paying attention. Calling the student's name, turning the lights briefly off and on, making a movement or touching the student may help to gain his/her attention.

e. If a student has difficulty understanding verbal communication alone, *total communication* (combined speech, sign, gestures, pantomime, writing, models and/or pictures) may be used.

f. If a student has greater hearing loss in one ear, he or she should be seated where the teacher's face can be seen and where the student's good ear will be closest to the teacher when speaking to the class. It is difficult to *understand (read) speech* when a person with limited hearing is more than two meters from a speaker. *Note: a person, good at speech reading can usually understand only 40% of what is said.*

g. Before beginning a lesson, teachers should print short sentences or key words and/or a simple outline of the lesson on the board. A printed outline may also be given to the student with impaired hearing. To permit advance preparation, the student may be given a list of new vocabulary 1-2 days before a lesson.

h. Students with hearing handicaps may have delayed language development. They may have limited vocabularies, and they may use simple or abnormal language structures. Thus, their ability to understand complex language may be limited. Therefore, teachers should a) introduce new topics with short and simple sentences, b) rephrase and repeat their instructions, and c) summarize and repeat discussions in which complex concepts have been discussed.

i. Whenever possible, use the *preview, teach and review approach to instruction*. The content of a lesson should be previewed before instruction begins. New concepts, vocabulary and/or complex language should be discussed. Simplified examples should be given. After new material has been presented, a review should be provided to insure the lesson has been understood.

j. When giving a demonstration, presenting objects or pictures, a teacher should use as many visual cues as possible. Point to objects or diagrams being discussed. Touch important features of the display. Students with limited hearing must rely on their eyes to receive much of their information.

k. Long, oral instructions and demonstrations should be divided into parts, giving students time to process each part.

l. When instructions and/or demonstrations are given to the whole class, the teacher should move closer to the student with a hearing impairment. The teacher should make sure the student has understood the lesson. Ask the student to tell or explain or demonstrate what he or she has heard or seen. If an assignment has been given, ask the student to describe what he or she thinks ought to be done. To avoid public ridicule of the student, the teacher should go to the student to ask these questions.

m. Because students with impaired hearing cannot read speech and take notes at the same time, it may be helpful if another student shares carbon copies of his or her notes. Care should be taken to select a student who writes clearly and who takes good notes. As mentioned previously, the teacher may also give the student a copy or summary of the teacher's notes.

n. Students with hearing handicaps may be assigned a "buddy" or "assistant" to help them. This carefully selected person can take notes, answer questions and guide the student with limited hearing. Care should be taken to insure that the student with limited hearing is not being given more help than is required. The student with limited hearing should be as independent as possible. Also, the buddy should not be overly distracted from his or her work.

o. Students with hearing impairments should be encouraged to ask questions when they do not understand. Note, however, that many hard-of-hearing students are quite aware that their speech is different from that of other students. Because they do not want to expose their differences in public, they may refuse to speak publicly. Note too, that many students with hearing impairments give the impression of knowing more than they actually do. They are keen observers of other students and may imitate what other students do without really understanding the situation. They may raise their hands when other students do, laugh when they do, and follow activities without understanding the directions or the purpose. When a student with impaired hearing is always raising his or her hand when other children do, the student should occasionally be asked to answer the questions asked. The answers will indicate if the students has understood or is just imitating the other students (Brackett & Maxon, 1982).

p. If a student has not understand a verbal message, it should not simply be repeated in the same form. The message should be rephrased and/or reworded.

q. If a student with limited hearing appears to be "dreaming" or inattentive, the teacher should determine if the student understands the lesson before disciplining him or her. Students with impaired hearing need to be disciplined just like normal hearing students. However, they should not be disciplined if they cannot understand the lesson, demonstration or instructions. Note too, that a student's hearing loss can change with earaches, colds, throat infection and allergies. In addition, watch for signs of fatigue. Speech reading is extremely tiring over long periods of time. The student's ability to understand verbal communication may change with time and circumstance.

r. During classroom discussion, students with limited hearing may have difficulty following the discussion. They may not be able to identify the location of new speakers. Time and information may be lost while the student with impaired hearing tries to locate a new speaker. As a result, some opportunities to read speech and gestures may be lost. In addition, it may be difficult to read the speech of distant speakers whose faces may not be clearly visible. Thus, during class discussions, students with impaired hearing should be allowed to move to locations where they can better observe other students. In addition, the teacher should make a habit of pointing to the person speaking. Students could stand and face the student with a hearing impairment when they begin to speak. The teacher should repeat questions and answers, and summarize comments made by other students.

Assigning independent work

Several suggestions for improving the manner in which independent work is assigned are listed below.

a. When students are assigned *seat work* (work to do alone at a table or desk), they should be given *task cards* on which instructions have been printed in a simplified manner. Step-by-step instructions should be given to students with impaired hearing. Pictures may also be used. A glossary may be handed out in which key words are explained in the student's language.

b. *Study guides* take a long time to prepare. They are useful, however, for a great variety of students. Therefore, it may save time if one study guide is prepared for a variety of different students. Students with specific handicaps could simply be told to attend to particular parts of the guide. For example, one group of students could be told to study items 3, 4, 7 and 10. Students in another group could be told to solve items 3, 5, 6, and 10, etc.

Using equipment effectively

Several suggestions for environmental management to improve hearing, and for diagnosing and correcting problems with hearing aids are described below.

a. Noise in the classroom should be reduced so that students with auditory disorders can use their limited listening skills. Common classroom noises such as chairs scraping on the floor, air-conditioning, ceiling fans, the conversations of other children, and sounds from outside open windows can greatly reduce the ability of students with hearing impairments to use their *residual hearing*. Students with limited hearing should be seated close to the teacher and away from sources of noise.

b. *Hearing aids.* Teachers should insure that hearing aids are worn and that they are working well. The following guidelines have been adapted from Hull and Dilka (1984) and from Rubin (1975). The excellent and inexpensive booklet by Rubin, *All about Hearing Aids* is highly recommended. *Teachers should do a daily hearing aid check.* In North America, there is strong evidence that 40-60% of the hearing aids in educational settings are usually not operating properly (Coleman, 1972; Kemker, McConnell, Logan & Green, 1979).

In a quiet place, the teacher should put the hearing aid mold in his or her ear and block the other ear. Have someone stand beside the teacher, on the side with the hearing aid, and talk to the teacher in a normal voice. Listen for the following problems.

If there is no sound from the aid:
- Is the switch in the "on" position?
- Try another battery.
- Has the wrong type of battery been used?
- Make sure the "+" sign on the battery is matched with the "+" sign on the aid.
- Use a sharpened pencil eraser and gently remove any corrosion (white powder) from the ends of the battery and inside the aid (a damp cloth may also be used, but *all* moisture must be removed).
- Remove any wax from the earmold.
- Take any twists out of the sound tubing on *over-the-ear aids.*
- For a *body-type aid,* wiggle, withdraw, clean and reinsert all plugs.
- Check that the microphone on a body-type aid is not facing the body.
- On body-type aids, check for a break in the cord by gently rolling each part of the cord between thumb and forefinger. If sound goes on and off, the cord is broken.

If the aid is sometimes on and sometimes off:
- On body-type aids, gently roll the cord between thumb and forefinger, if the aid goes on and off, the cord should be replaced or taken for repair.
- On body-type aids, wiggle, remove, clean and reinsert all plugs.

Loudness does not change smoothly as the volume control is turned up: either the aid is always loud or sound comes out suddenly when the volume control reaches a certain point.
- The volume control is faulty and requires repair or replacement.

Sound from the aid is weak:
- Try a new battery.
- Remove wax from the earmold.
- Take any twists out of the sound tubing.

The aid is noisy:
- Move the volume control and the off-on switch back and forth several times. Doing this may remove tiny pieces of dirt.

The sounds are unnatural (e.g., static):
- Try a new battery.
- Adjust the tone control.
- The aid may be affected by perspiration and humidity (it must be kept dry at all times). Put it into a closed jar or plastic bag with a drying agent e.g., silica gel. In damp conditions, this should be done weekly or even each night.
- Clean the battery contacts with a sharpened eraser.

The aid squeals or whistles:

Squealing is natural in body-type aids when the receiver is out of the ear, near the microphone and the volume is turned up. With over-the-ear aids, squealing occurs when the aid is out of the ear, turned on and held in a cupped hand. Squealing also occurs when the aid is in the ear and solid material, a hand or hat is placed near the ear. Otherwise:
- be sure the earmold fits well into the ear. Press earmold firmly into ear and twist back and forth slightly. It should fit firmly and comfortably (look for red areas in the ear).
- Check for cracks in the earmold.
- Check for cracks in the earmold tubing or in the ear hook of over-the-ear aids.
- Make sure the "T-M" switch is in the "M" position.
- Remove wax from the ear mold.

Speech Hearing Test

The following test is adapted from the Ling Five Sound Test (Ling & Ling, 1978) and the GASP Test (Erber, 1982). Apologies are made to everyone with phonetic skills. The circumstances in which the test will likely be used suggested slight deviations from technically correct procedure.

Students able to hear all of the sounds tested will be able to hear all English speech. The more sounds in the test a student is unable to hear, the less able he or she will be to hear and understand the sounds of English speech. The more sounds in the test a student is unable to hear, the greater the need for professional testing and treatment.

Testing procedure

a. Read and rehearse the entire test several times.

b. Find a place away from other people, noise and interruption to do this test.

c.. Both the teacher and student should sit facing each other, one meter apart.

d. Say, "I want you to listen (point to the student's ear and turn your head as if listening). If you hear something *signal 'yes.'* If you do not hear anything *signal 'no.'*"

(Select a method, common to the culture, for signaling "yes" or "no." For example, in North America, "yes" is signaled by moving one's head up and down. "No" is signaled by moving one's head back-and-forth). Substitute the method selected for the words *signal "yes"* and *signal "no."* For example, in North America, the teacher would say, "If you hear something, nod your head (teacher demonstrates). If you do not hear anything, shake your head" (teacher demonstrates).

e. Say, "Listen." (Point to the student's ear). Cover your mouth with a card (15 x 25cm). In a loud voice, say "*aw*" as in "odd." Uncover your mouth *immediately.*

f. If the student does not immediately *signal "yes,"* help him/her to *signal "yes."*

g. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. In a loud voice, say "*aw*" as in "odd." Immediately remove the card.

h. If the student signals "yes," go to step g. If the student does not signal "yes," help him or her to do so. Repeat steps c, d and e again.

i. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. *Pretend* that you are making a loud "aw" sound *but make no sound.* Immediately remove the card.

j. If the student signals "no," proceed to step i. If the student does not signal "*no,*" help, him/her to signal "*no.*" Repeat step g.

k. Repeat step e, then g, then g, then g, and then e. If the student signals "yes" and "no" correctly on all trials, go to step j. If the student does not signal "yes" and "no" correctly on all trials, he/she may not be able to hear the *aw* sound (for most students, it is one of the easiest sounds to hear). The student may not understand how and when to signal "yes" and "no." The student may not be trying to do the test properly. Go to step j. aware that the test may not be valid.

l. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. In *a normal voice* say "*ew*" as in "blue." Immediately remove the card. Record if the student signals "yes" or "no."

m. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. *Pretend* that you are making a sound *in a normal voice but make no sound.* Immediately remove the card. Record if the student signals "yes" or "no."

n. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. *Pretend* that you are making a sound *in a normal voice but make no sound.* Immediately remove the card. Record if the student signals "yes" or "no."

o. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. *Pretend* that you are making a sound *in a normal voice but make no sound.* Immediately remove the card. Record if the student signals "yes" or "no."

p. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. In a *normal voice* say "*a*" as in "*a*sk." Immediately remove the card. Record if the student signals "yes" or "no."

q. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. In a *normal voice* say "*ee*" as in "b*ee*t." Immediately remove the card. Record if the student signals "yes" or "no."

r. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. *Pretend* that you are making a sound *in a normal voice but make no sound.* Immediately remove the card. Record if the student signals "yes" or "no."

s. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. In a *normal voice* say "*sh*" as in "*sh*ed." Immediately remove the card. Record if the student signals "yes" or "no."

t. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. *Pretend* that you are making a sound *in a normal voice but make no sound.* Immediately remove the card. Record if the student signals "yes" or "no."

u. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. *Pretend* that you are making a sound *in a normal voice but make no sound.* Immediately remove the card. Record if the student signals "yes" or "no."

v. Say, "Listen." (Point to the student's ear). Cover your mouth with the card. In a *normal voice,* say "*sss*" as in "send." Immediately remove the card. Record if the student signals "yes" or "no."

w. Repeat steps j. to u. in reverse order. Record if the student signals "yes" or "no."

This test and the test that follows are informal tests given under relatively uncontrolled conditions. Neither test indicates the amount or type of hearing loss. Neither test indicates the presence or absence of disease and deterioration. Neither test can be used to predict future performance. Neither test can replace a formal audiological evaluation given by a skilled professional.

Diagnostic Testing and Teaching of Students with Limited Hearing

The results of this test tell teachers how much or how little of what they say is understood by students with hearing impairments. The results will also show the success or failure of various methods designed to improve communication. This is a test of communication in which both the teacher (sender) and the student (receiver) are being tested.

Testing procedure

a. Read, rehearse and prepare for the entire test before using.

b. Select a training task that:
   - requires little time to teach;
   - you intend to teach to the whole class one day during the next two weeks; and
   - you think the student with limited hearing has the skills to learn.

c. Analyze the task into teachable steps. Refer to the discussion of performance analysis in this text.

d. Prepare all materials required to teach the task.

e. Remove all students from the classroom, except the student to be tested.

f. Have the student with limited hearing sit in his/her usual seat. Stand where you usually stand to speak to the entire class. Face the student. Ordinarily, the student should be within 2 meters of the teacher.

g. The natural light within the room should fall on your face and upper body. Your face and upper body should be free from shadows. Do not stand between the student and a light source, for example, a window.

h. Do not speak louder than usual. Do not use single words or short phrases instead of sentences. Do not move your lips in an unusual manner to show the sounds you are making. Do not distort the sounds of words by trying to emphasize each sound, e.g., "book" = "BB-ooo-KK." Speak in your normal manner, at a moderate rate.

i. Teach the first step in the task. Act as if you were teaching the whole class.

j. Confirm that the student has understood the first step in the task. Ask the student to describe, and/or demonstrate understanding of what you have said. Choose very simple methods for the student to respond. For example, do not ask the student to speak if his or her speech and language will not permit him to express understanding. Do not ask the student to point to pictures to answer your questions if she or he is inexperienced with the use

of pictures. Avoid asking questions that require a simple "yes or no" answer. The student can simply guess the correct answer 50% of the time. This part of the test is very important. You want to find out what the student has/has not learned. If you ask him or her to answer using a method that is too difficult, you will not get the information you want. Carefully plan this part of the test before you begin testing. Think of several different methods you could try.

k. If the student indicates that he or she has understood the first step, teach and confirm the next step in the task. If the student does not show understanding, he or she may not have understood. Alternatively, although he or she understood, they may not be able to express understanding. As mentioned above, first, offer the student various methods to express understanding. If you cannot find a suitable method for the student to communicate, the remainder of the test may not be valid. If the student does not indicate understanding, reteach the step while trying one or more of the following methods.
   - Rephrase your speech. Use simpler sentences. Use different words to express the same meaning.
   - Try using the "Special English" method of speaking, discussed earlier in this chapter.
   - Speak in a slightly louder voice without distorting your natural speech. Have someone listen to you to make sure you are not distorting your mouth or the natural style of speech.
   - Increase the lighting in the room. Remove any glare or shadows.
   - If you know of manual signs or gestures used by students with hearing impairments to represent some words or ideas, use these signs where appropriate.
   - Try using more gestures when you talk. Use pantomime. Use your facial expressions, body movements and gestures to communicate.
   - If possible, use more examples or demonstrations (on the chalkboard, in pictures or use actual objects the student can touch).
   - Improve the visibility of the materials, objects, demonstrations, diagrams and pictures used.
   - Use *total communication*, use a number of the previously mentioned methods at the same time.
   - If the student appears not to be trying to communicate, use rewards for any efforts made. Review the section in this text on rewards.

l. If the student does not express understanding after all of these methods have been tried, she or he may not understand because, a) she or he has difficulty understanding your communication

methods, b) she/he does not have the skills necessary for learning the task you are trying to teach, and/or c) she/he does not have a method for expressing understanding. Try teaching a simpler task. In fact, over several weeks, using the methods described above, you should try to teach tasks from each area of the curriculum. If you are still having difficulty, seek professional advice, if available.

m. If you identify useful methods for teaching the student in each subject area, remember that hearing is much more difficult in a noisy classroom. Probably, the most commonly heard complaint of hearing impaired people is that they can hear and understand speech in quiet conditions, but that they experience severe problems either in noisy environments or in the presence of ongoing conversations (Rintelmann, 1979). Therefore, it is important that the use of any methods of communication found to be successful during this test should be tested under typical classroom conditions.

n. As a student's ability to understand communication may change as a result of fatigue, colds, infections, sore throats, allergies, etc., these tests should be repeated occasionally.

Selected References

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Chapter Eight

Teaching Students with Limited Vision

A UNESCO seminar on children with visual handicaps, held in Malawi, recommended that students with visual handicaps, who still have some limited, useful vision, should be encouraged to use their sight unless there is clear medical evidence for not doing so. It was also recommended that partially-seeing children should be taught to read and write ordinary script, supported by braille only to the extent that this is justified by a particular child's present and assessed future *visual acuity* (ability to see in sharp detail) (UNESCO, 1981). These recommendations are widely supported in the literature. In the discussion that follows, a number of suggestions are made for working with and improving each student's usable vision. A number of related references are reported at the end of this chapter.

General Recommendations

When to make a referral

Students who often show one or more of the following symptoms should be sent to a doctor or a vision specialist.

a. Often blinks eyes.
b. Often rubs eyes.
c. Eyes are red, swollen, watery and/or crusted.
d. Often shuts or covers one eye.
e. Has frequent headaches.
f. *Pupil* (the small black spot in the middle of the eye) is cloudy.
g. Often has difficulty following a moving object.
h. Eyes tremble.
i. One eye does not always look directly at an object.
j. One pupil (the small black spot in the middle of an eye) is larger than the pupil in the other eye.
k. Often has difficulty seeing distant objects clearly.
l. Often narrows eyelids when trying to see something.
m. Often holds reading material or other objects closer than 35cm or further away than 50cm.
n. Often turns head sideways when looking or reading.

o. Often confuses the following letters in reading or spelling: "o and e; e and c; n and m; h and n; r, f and t."

p. Often uses finger to follow words while reading.

q. Often loses place while reading.

r. Often looks in the wrong direction when given something to look at. Looks at only a part of a visual display.

s. Has drooping eyelids.

t. Often stares at light.

Communicating effectively

General suggestions are listed below for communicating effectively with students having limited vision.

a. Teachers should make sure of having a student's attention before beginning instruction or demonstration. A student's attention may be gained and directed when discussion is begun by saying the student's name, by turning the lights briefly off and on, or by having a nearby student *gently* touch the student and point to the teacher.

b. When speaking to a partially sighted student, the teacher should not stand with a light source (e.g., window) behind him or her. Preferably, the light source should be behind the student and fall on the teacher's face and upper body.

c. When giving instructions or demonstrations to a whole class, the teacher should move closer to students with limited vision. Also, when instructions and/or demonstrations have been given to the entire class, the teacher should ensure that students with visual handicaps have understood. The students may be asked to tell, explain or demonstrate what they have seen and/or heard. To avoid public ridicule of students with impaired vision, it may be best to go to each student and ask these questions privately.

d. Because students with visual disorders may have difficulty writing long sets of lectures or instructions, it may be helpful if teachers make tape recordings of lessons or instructions. Also, whenever possible, students with limited vision should be taught to make brief and effective notes. These notes should occasionally be reviewed by the teacher. The accuracy of the notes should be evaluated. This information will indicate where changes in lectures and/or note-taking are required.

e. As soon as possible, the student should be taught to use a typewriter without looking at the keys. Type-written notes can be made more rapidly than hand-written notes.

f. Students with limited visual experience often have difficulty visualizing objects or events that are being discussed. Thus,

whenever possible, concrete, manipulative materials that the student can see and touch should be used.

g. Teachers should be sure that mimeographed papers are fully legible. Avoid giving students faded, streaked or blurred sheets that have printing on both sides.

h. Care should be taken to avoid presenting too much material on a page. Print with large letters.

i. Large spaces should be left for calculations and answers on arithmetic worksheets. Students with visual impairments often write letters and numbers larger than other students do.

Assigning independent work

Suggestions are listed below for improving the manner in which independent work is assigned to students having limited vision.

a. When a student with extremely limited vision is working with several different types of materials, small boxes or other containers may be used to help the student organize and find the equipment.

b. When a student is working on a large surface where materials may become misplaced or move into another student's working area, a border may be placed around the student's work space. A coil of rope, a strip of bamboo, or a straight branch may be used.

c. A bookstand may be used on a student's desk to free the student's hands, to hold the book closer and to hold it at a better angle for reading.

d. A fellow student may be assigned to work as a "*buddy*" or "assistant" to the student with limited vision. The buddy can copy material in large print, describe events that are happening and read to the student when required. The buddy may also read notes onto a tape recorder to be listened to in future. Care must be taken to select good students as buddies. Avoid giving too much help. Students with visual impairments must be taught to be as independent as possible. Caution must also be taken to insure that the buddy is not spending too much time away from his/her own work.

e. Students with limited vision should not work in shadows or on highly polished surfaces from which a glare or reflection may reduce vision.

f. Close work should be limited to short periods of time, alternating with distant work.

g. When a student's eyes get tired, he or she should bathe them with a cloth soaked in cool water.

h. The visual skills of students with impaired vision may change as a result of long periods of close work, fatigue, illness or different

levels of lighting. By early afternoon, students with limited vision may not be able to perform as well as they could earlier in the day. If possible, rest periods or alternative activities should be scheduled between sessions of close work.

i. Putting a thin, raised line of clear glue around the outline of objects in pictures, may help students with limited vision feel, find and see the edges of the figure.

Giving effective demonstrations

Giving visual demonstrations to students with limited vision can be difficult. Suggestions are listed below for improving visual demonstrations to students with limited vision.

a. When visual demonstrations are being given to partially sighted students, the materials should be presented against a background of contrasting color. For example, if dark colored objects are used, the teacher should hold the objects in front of a light colored background. Teachers may find it useful to have available large pieces of both light and dark poster card to reach over or around during a demonstration. The teacher may also wear an apron of contrasting color.

b. During a demonstration, teachers should provide a rich verbal description of each part of the task. Important parts of demonstrations or pictures should be pointed to or touched.

c. Demonstrations should be given at a rate slow enough for the student with limited vision to follow each step. A long or complex demonstration may be divided into parts with a pause between each part.

Using equipment effectively

a. Teachers should make certain that visually impaired students wear their glasses, and that the glasses sit properly on the student's nose.

b. Students' glasses must be kept clean. Students should be taught to clean and protect their glasses from scratches and breaks. Some students may be unaware their glasses are dirty.

c. Some students may find considerable benefit from using a magnifying glass. These glasses should be large and without defect. The glass should be kept clean and protected from scratches. A *bar magnifier* is a clear, plastic bar that fits over one line of type and usually magnifies it to double its size.

d. Non-shiny paper with either no lines or bold, dark lines should be used.

Working at the chalkboard or slateboard

a. When printing words on the board, teachers should read each word aloud as it is being printed. Spelling new words aloud may also be helpful. Similarly, when something is being drawn or a diagram is being presented, teachers should provide a rich verbal description to help the student "see" what is being represented.

b. When presenting a demonstration, a diagram or writing on the board, teachers should allow enough time for students with visual impairments to study the display. Students with limited vision require more time to look at things than do other students.

c. When presenting a demonstration, a diagram or writing on the board, teachers should let students with visual limitations move as close as they wish.

d. Rather than having a student with limited vision copy printing or a diagram from the blackboard, the teacher should give a copy of the material to the student on a piece of paper that she/he can use.

e. When presenting a complicated picture to the class, a simplified version may be given to the student with limited vision.

f. Some students with particular visual handicaps may find it easier to look sideways or continually move their heads while watching a display. This behavior should not be misinterpreted.

g. Students with visual handicaps may find it useful to work at the chalkboard. The large print may make it easier for them to see.

Selecting the Best Methods for Presenting Visual Information

Presenting information at the chalkboard or slateboard

Follow the steps below to find the best method for printing on the chalkboard so that students with limited vision can read the printing.

This is an "informal" test. The test requires no special equipment or special training. Testing is done under natural classroom conditions. Because the student makes only simple responses, the test may be given to young, low functioning or older students. The test is suitable to various cultures.

This is not a formal test of vision. The test will not indicate the presence of disease or deterioration. The test will not indicate the amount or type of visual loss. The test cannot replace a formal test given by a specialist. This is a test of the ability of a student with limited vision to read letters of various heights from the chalkboard. Do not use any materials other than chalk or the chalkboard. Do not make a permanent copy of the test on a card.

Before giving the test to the student with limited vision, give it to one or two students with normal vision. Use the same testing conditions as described below. If these students have difficulty with the test, change

small parts of the test until these students can perform well. Do not let the student with the vision problem see the test being given. It is important to read and rehearse the entire test carefully before giving the test to the student with a vision problem.

Testing procedure

a. In the student's regular classroom, when other students are absent, use ordinary chalk to print four rows of the letter "E" on the chalkboard. As shown in Figure 8.1, below, different rows of "Es" will vary in *height*. Also, some of the "Es" will be turned backwards, on their sides, or on their back. The *"arms"* of the "Es" will *point* to the left, right, up or down. The arms and back of the Es in row 1 are 2cm thick. They can be easily seen. The arms and back of the "Es" in all other rows are only one, single chalk line wide. These "Es" are used to see how well the student can read ordinary print. Do not make these lines wider than a single chalk line. Space all "Es" 5cm apart.

b. The student should sit in the seat closest to the chalkboard (approximately 2 meters away).

c. The regular light in the room should fall on the chalkboard. There should be no glare, reflections or shadows on the chalkboard. The board should be wiped clean.

d. If the student wears glasses, clean the glasses and seat them correctly on the student's nose.

e. The teacher should stand beside the "E" on the board.

f. Call the student's name. Ask him or her to look at the top row of "Es." Point to the first "E" on the left.

g. *Training phase*: Show the student that the "arms" of the first letter are pointing in "this" direction (point your arm in the same direction as the arms of the letter "E"). Put your finger under the first letter and tell the student to "Point your arm in the same direction as the arms of 'this' letter."

h. Repeat step g. for all of the "Es" in row 1. Do not do the rest of the test until the student can consistently point in the same direction as the arms of all of the "Es" in row 1. If necessary, use physical prompts and rewards to train the student.

   In the test that follows, *DO NOT PROVIDE ANY HELP TO THE STUDENT*. This is a test to see how well the student can read from the chalkboard without special assistance.

i. Point to the first "E" in row 2. Tell the student to "Point in the same direction as the arms of the E."

j. Repeat step i. for each of the other "Es" in row 2.

k. Use the same method for each of the other rows. If a student fails two or more "Es" in any row, stop the test. The smallest size row

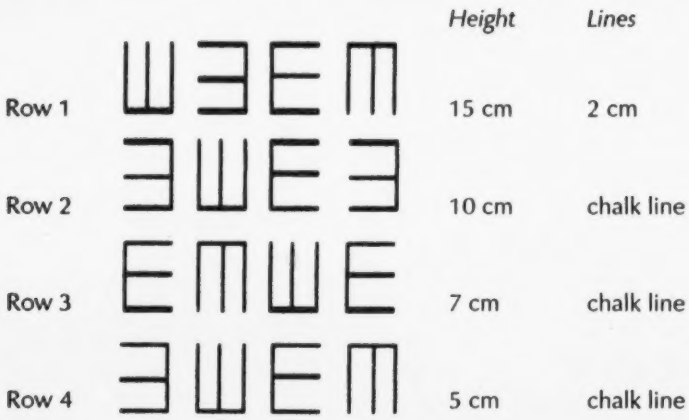

Figure 8.1

of Es the student can read correctly is the smallest size of printing the teacher can effectively use when printing on the chalkboard.

l. The test may be repeated several times to study the effect of one or more of the following changes. Record the method that works best.
   - Move the student closer to the chalkboard.
   - Wash the board.
   - Use a better chalkboard (smoother surface, different color).
   - Try a different color of chalk.
   - Try thicker chalk.
   - Increase the amount of light shining on the board (avoid glare, reflections or shadows).

m. Because a student's vision may change, repeat the entire test every three or four months.

Presenting information at the student's desk

This is a test of the ability of a student with limited vision to read printed material at his/her desk. The test shows the smallest printed material the student can read and the amount of lighting required. This is an informal test, requiring no special equipment. No special training is required to use the test. Testing is done under natural classroom conditions. Because the student makes only simple responses, the test may be given to young, low functioning or older students. The test is suitable to various cultures.

Testing procedures

a. The student should sit in his or her usual seat in the regular classroom.

b. The teacher should stand or sit next to the student.

c. The light available in the room should fall on the student's desk but not on his or her face. There should be no glare, reflection or shadow on the desk.

d. Present the student with the Es printed in Figure 8.2, below. Use an unsharpened pencil (do not mark the page) to point to the first E in line 1. Ask the student to, "Point the same way the arms point."

e. Point separately to each of the Es in the line. Ask the student to, "Point the same way the arms point." Then point to the Es in lines 2-5. The smallest size row of "Es" the student can read correctly is the smallest size of printing the teacher can effectively give to the student to read.

f. The test may be repeated several times to study the effect of one or more of the following changes. Record the method that works best.
   - Put the sheet of "Es" on a bookstand.
   - Increase the amount of light shining on the sheet. Avoid light shining on the student's face. Remove all glare and shadow from the page.
   - Because a student's vision may change, repeat the entire test every three or four months.
   - The results of this test will indicate the smallest size of print the student will be able to read (the smallest size "Es" that the student got correct). The test will also indicate the amount of light required for the student to read.

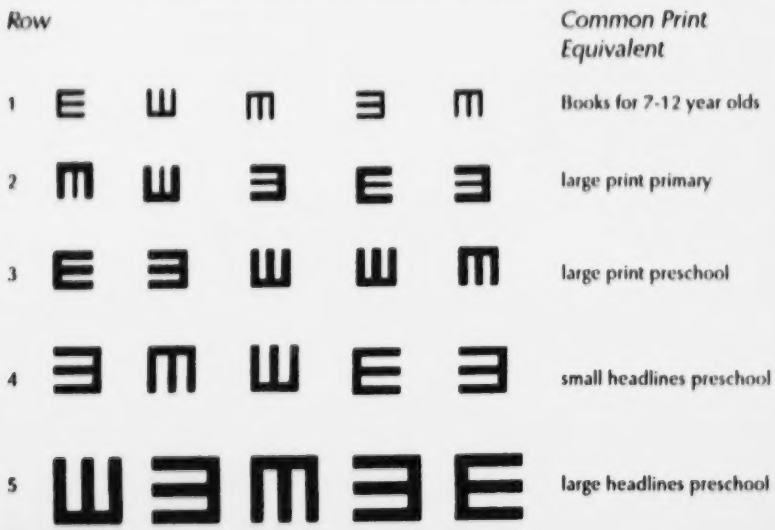

Figure 8.2

Presenting a demonstration

This is a test of the ability of a student with limited vision to see a demonstration given by the teacher. The test results show the size and speed of movements the student can see, and the amount of lighting required. This is an informal test, requiring no special equipment. No special training is required to use the test. Testing is done under natural classroom conditions. Because the student makes only simple responses, the test may be given to young, low functioning or older students. Note, however, that some young, inexperienced or multiply handicapped students may not be able to perform the test because they have not learned to imitate. Before using the test on students with visual problems, try the test on students of the same age and functioning level who do not have visual problems. If the student's peers cannot perform the test, do not give the test to the visually impaired student. The test is suitable to various cultures.

Testing procedures

a. The student should sit at his or her usual seat in the regular classroom. Other students should be absent.

b. The teacher should stand at the place in the classroom at which demonstration/lectures are usually given.

c. The natural lighting in the room should fall on the teacher's face. There should be no bright lights or window behind the teacher.

d. *Pretest.* Call the student's name. Say, "Watch me." (pause). Say, "Do this." Raise your left hand over your head (pause 1 second) then return your hand to your side. Say, "You do it."

e. If the student raises his right or left hand over his head and returns the hand to the side, go to step k. If the student does not do the task, move within reaching distance of the student and call the student's name. Say, "Watch me." (pause). Say, "Do this." Raise your left hand over your head (pause 1 second) then return your hand to your side. Say, "You do it."

f. If the student imitates the action, go to step k and return to the place in the classroom at which demonstration/lectures are usually given. If the student does not do the action, call the student's name. Say, "Watch me." (pause). Say, "Do this." Raise your left hand over your head (pause one second) then return your hand to your side. Say, "You do it." PHYSICALLY HELP THE STUDENT TO IMITATE THE ACTION.

g. Call the student's name. Say, "Watch me." (pause). Say, "Do this." Raise *both* hands over your head (pause one second) then return your hands to your side. Say, "You do it."

h. If the student imitates the action, go to step k. and return to the place in the classroom at which demonstration/lectures are usually given. If the student does not do the action, Call the

student's name. Say, "Watch me." (pause). Say, "Do this." Raise both your hands over your head (pause one second) then return your hands to your side. Say, "You do it." PHYSICALLY HELP THE STUDENT TO IMITATE THE ACTION.

i. Call the student's name. Say, "Watch me." (pause). Say, "Do this." Raise both arms straight out to the sides (pause one second) then return your hands to your side. Say, "You do it."

j. If the student imitates the action, go to step k. and return to the place in the classroom at which demonstration/lectures are usually given. If the student does not do the action, do not continue the test. It is uncertain if the student is unable to see the movements made by the teacher or if he or she is unable or unwilling to imitate the teacher's action. Assistance will be required to further evaluate the student's abilities.

k. *The test*: say, "Watch me." Move your right hand and touch your nose (pause one second) and return your hand to your side. Say, "You do it." Record how the student responds.

l. Say, "Watch me." Move your right hand and touch your mouth (pause one second) and return your hand to your side. Say, "You do it." Record how the student responds.

m. If the student imitates both actions, continue with step n. If the student did not imitate both actions repeat the test (on each trial touch either your eye, mouth, or nose) and test the effect of one or more of the following changes. Record the method that works best.

Change methods

- Move your hands and arms more slowly.
- When your hand comes to a stop, hold it in place for two or three seconds.
- Increase the amount of light shining on the teacher.
- Move closer to the student.
- Wear clothing that contrasts better with the surroundings. For example, if the walls are dark, wear light colored clothing. Try plain rather than patterned, multicolored clothing.

If one or more of these changes is effective, go to step n. If these changes are not effective, do not continue testing. The information gained will indicate the best conditions under which the student can see a demonstration. The information will also show the type, size and speed of movements the student is able/unable to see. As the student's vision may change, repeat the test in three to four months.

n. Make a list of several, simple demonstrations that you usually give in the classroom. Give the demonstrations one step at a time. Say, "Watch me." Do the action (pause one second). Say, "You do it." Continue down the list until the student is unable to do two

actions. Try one or more of the "change methods" in step n. The information gained will indicate the best conditions under which the student can see a demonstration. The information will also show the size, type and speed of movements the student is able/unable to see. As the student's vision may change, repeat the test in three to four months.

Even if the test leads to better use of the chalkboard, reading material and demonstrations, the student should be sent to a doctor or vision specialist. Vision experts may be able make additional improvements in vision and reduce or stop further deterioration.

Selected References

Some useful references used in this chapter are listed below.

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Chapter Nine

Testing: Problems, Issues and Recommendations

The goals of the following chapter are to:

a. discuss problems and issues related to the adoption of Western tests by Developing Countries: translating tests, ecological validity, inappropriate norms and out-of-date tests;

b. review problems associated with Western methods of assessment: norm referenced tests, developmental tests, adapting tests for handicapped persons, clinical and in situ testing; and

c. make recommendations for improving methods of adopting, adapting, developing and using tests in Developing Countries.

Adopting Western Tests

In an article on personality tests, Sinha (1984) reported that psychologists in India have shown a strong tendency to indiscriminately borrow tests from Western countries. In fact, referring to tests in general, Kulkarni and Puhan (in press) claim that one can hardly find a test in India that has not been borrowed directly or indirectly from Western sources.

In Developing Countries, there is a shortage of economic resources and specially trained test development personnel. As well, there is a heavy demand for testing and treatment services (the vast majority of the world's 450 million disabled people live in Developing Countries [Noble, 1981]). Thus, it is little wonder that Developing Countries adopt from Western Countries apparently respectable, and readily available, specialized tests, methods and materials. Why "reinvent the wheel"?

However, many of the adopted tests are not ideally suited for use in Developing Countries. In some cases, test items have been culturally biased. Test instructions and questions have not been generally understood. Pictures have been unfamiliar and the norms used to interpret the test results have been inappropriate. Some of these tests continue to be used in their original form; some have been modified. In the discussion that follows, a review is made of problems, issues and recommendations related to adopting, adapting and using Western tests and testing methods.

Translating western tests

In India, the majority of tests used are simply translations into a local language of well-known Western tests (Wig, Pershad & Verma, 1974). For example, some of the Western tests that have been translated in India are:

the Vineland Social Maturity Scale (Nagpur Adaptation by Malin, 1968), the Bayley Scales of Development (Phatak, 1961, 1962), the Stanford-Binet Intelligence Scale (Kulshreshtha, 1971), the Gesell Developmental Schedule (Muralidharan, 1976), the Wechsler Intelligence Scale for Children (Malin, 1971), the Draw-a-Man Test (Phatak, 1961, 1962, 1984), the Standard Progressive Matrices, Gesell's Drawing Test (Verma, Pershad & Kaushal, 1972), and the Sequin Form Board (Verma & Randhawa, 1979) (reported in Verma & Pershad, 1979). The National Council of Educational Research and Training in Delhi has published several catalogues of tests in use in India (Pershad, Verma & Randhawa, 1984).

Wig, Pershad and Verma (1974) reported that many of the Western tests translated into local languages were not very helpful. Many of the concepts used were culture bound and difficult to translate into other languages. The *Standards for Educational and Psychological Testing* (AERA, APA & NCME, 1985) recommended that when a test has been translated from one language or dialect to another, its reliability and validity should be reestablished for the linguistic groups for which it will be used (Standard 13.4). Frequently, in Developing Countries, when a test has been translated, the validity and reliability of the revised test are not evaluated. For example, Mehta (1978) reported that no such analysis had been made of Kulshreshtha's translation into Hindi of the Stanford-Binet Intelligence Scale. When a test is translated from one language or dialect to another the reliability and validity of the test may change significantly. For example, the test-retest reliability of Gesell's Developmental Schedule translated by Muralidharan (1976) is reportedly very low and unacceptable (Verma & Pershad, 1979).

Often it has been assumed that the translation of verbal instructions is the only significant step required for making an imported Western test suitable for use in other socio-cultural settings (Serpell, 1984). The problems, however, of translating a test to a new language or dialect are many and complex. One cannot assume that translation produces a version of the test that is equivalent to the original test in content, difficulty, reliability and validity. These characteristics cannot be assumed to be comparable across languages and dialects. For example, many words have different frequency rates or difficulty levels in different languages and dialects. Therefore, words in two languages, that appear to be close in meaning, may differ radically in other important ways. In addition, test content may be inappropriate in a translated version (AERA, APA & NCME, 1985).

Occasionally, Western tests are administered in an untranslated form to examinees who speak English. Here too, however, difficulties may arise. Testing people who have not had substantial exposure to English *as it is used in tests* presents special challenges. Test results may not accurately reflect the abilities being measured if test performance depends on an examinee's knowledge of English as used in the test (AERA, APA & NCME, 1985).

People who are familiar with two or more languages can vary considerably in their ability to speak, write, comprehend and read in each language. Some individuals, familiar with two languages, may perform more slowly, less efficiently and, at times, less accurately on problem solving tasks that are administered in the less familiar language (AERA, APA & NCME, 1985).

Problems of ecological validity

A test that is ecologically valid assesses the functional skills required in particular socio-cultural, economic, linguistic and geographic environments. The content, format and administration of a test are evaluated to determine its ecological validity. The content refers to the knowledge and skills tested. The format refers to the manner in which the knowledge and skills are tested. The stimulus format relates to the form in which each test item is presented (e.g., pictures, diagrams, verbal and/or printed matter) and the social and physical conditions in which the test is administered (e.g., by a stranger, in a one-to-one clinical setting). The response format refers to the manner in which examinees are required to respond (e.g., verbal, written, multiple-choice, matching, etc.).

Tests designed for use in one socio-cultural, economic, linguistic and geographic environment are frequently not ecologically valid for use in other environments. A well respected test, valid and reliable in one environment, may be quite inappropriate for use in another environment. The test may measure skills that are not required in other environments and may fail to measure skills that are required. Even when the test does assess skills that are required, the manner in which they are assessed may not be appropriate. Several examples follow.

Western tests characteristically require examinees to demonstrate their best behavior to a stranger (the examiner) in a highly structured, unfamiliar environment (a clinic). However, as Mittler and Serpell (1985) have indicated, children in some cultures seldom engage in prolonged, intensive, structured, dyadic play with adults. They may be reluctant to speak in elaborate language to an adult, particularly a stranger. They may be trained to speak to adults only in response to specific questions. Thus, in a testing situation, such children may respond to an adult who is probing for elaborate speech with only short phrases or by shrugging their shoulders (AERA, APA & NCME, 1985). Children in West Africa, according to Mussen (1970), lack experience in verbal labelling or dealing with words independent of the contexts in which they are customarily used. Traditional, verbal methods of Western testing may not be valid when used with these children. The test results may not accurately represent an examinee's skills. These skills may be revealed only when an ecologically valid test is used.

A test, useful with children in one culture, might be quite inappropriate for similar children in another culture. For example, although a Canadian and an African child may have equivalent mathematics skills, if they are given a mathematics test designed for children in Africa, the

Canadian child may get a much lower score than that of the African child. The test may not be ecologically valid for Canadian children. Although the test may assess mathematics skills known equally by both the African and the Canadian child, the manner in which the skills were tested may have been familiar to the African child and unfamiliar to the Canadian child. The test was not ecologically valid for use with the Canadian child.

Serpell (1972) has provided another example of the use of tests that are ecologically invalid. Several Western intelligence tests require the copying of shapes or designs. Africans generally score relatively low on these tasks. Do Africans have lower intelligence than Westerners or are the tests ecologically invalid? Drawing with a pencil and arranging patterned blocks like a jigsaw, the usual modes of copying required on these tests, are skills Western children learn at home and in school at a very early age. Zambian children have little opportunity to perform these specific tasks. In parts of Zambia, pencils, patterned blocks and picture puzzles are uncommon. As a result, do Zambian children lack the perceptual and motor skills required to see and copy patterns? In fact, Serpell discovered that a very popular hobby among boys in Lusaka was to build skeleton cars out of old bits of wire. The models were quite intricate, with suspension and steering. Apparently, the children in Lusaka had very well developed visual-motor skills. Serpell asked children in Manchester, England to use pliable wire to demonstrate their visual-motor skills by copying simple shapes. The English children got much lower scores on this task than did the children from Lusaka. The English children had been given an ecologically invalid copying test.

Pictures are common in Western countries, and children learn how to interpret pictures at an early age. Pictures are frequently used in Western tests. Specialized skills are required to interpret pictures. Travers and Alvarado (1970) claim that it is doubtful that Western children can recognize the representation of movement in pictures before nine years of age. Movement is generally depicted in a picture in several symbolic ways. A moving object may be represented as a blurred image. The rear contour of the object may be repeatedly traced along the path of movement to simulate successive visual impressions of the object. A wake may be drawn that is similar to that shown behind a moving boat. Movement of an object may also be represented by showing the object in a state of disequilibrium. Children must have considerable experience with pictures to learn to interpret these methods of representing movement. In many Developing Countries, children have far fewer opportunities to look at pictures than do children in Western countries. This lack of experience with pictures affects many aspects of picture perception. For example, Serpell (1972) reported that children in Developing Countries frequently have difficulty understanding the manner in which depth is represented in two-dimensional pictures.

In addition, the objects represented by pictures in Western tests may be familiar to Western children and quite unfamiliar to children in Developing Countries. Mehta (1978) found that mentally retarded

children in India were unable to identify a number of the pictures used on the 1960 version of the Stanford-Binet Intelligence Scale. According to Mehta, these same children were able to recognize and name objects that were actually much more difficult, but with which the children had more familiarity. Even within a culture, children in different regions or socio-economic levels may not be able to recognize and name the same objects. For example, in the Kulshreshtha Hindi adaptation (1971) of the Stanford-Binet Intelligence Scale, the picture of the *barat* is reportedly biased against a South Indian child, while the picture of the *anguthi or sigri* is biased against city children of upper or middle class.

One approach to test adaptation is to substitute unfamiliar materials for those that are more culturally suitable. For example, Ramalingaswami (1975), when adapting the Wechsler Adult Intelligence Scale to suit the Indian culture, had to change as many as 21 of 26 items on the picture completion subtest and 7 of the 7 picture arrangement items. To adapt the Wechsler Intelligence Scale for Children to India, Malin (1968, 1969b) had to modify most of the items on the verbal subtest. Kulkarni and Puhan (in press), referring to personality tests, stated that there seems to be a belief among people who revise foreign tests that simply dropping a few items that do not discriminate between high and low scorers will ensure the validity of the revised test. However, according to Serpell (1984), the notion of replacing culturally unfamiliar materials has a deceptive appearance of simplicity. In reality, there are many aspects of familiarity that may influence performance. It is difficult to know how much and what type of changes are required to make a test culturally acceptable (Serpell, 1984).

One area of testing in which there are obvious problems of ecological validity is that of adaptive behavior. A systematic study of adaptive behavior and its measurement in India was made by Upadhyaya (1974) and Upadhyaya and Borikar (1974) in connection with a rehabilitation project in which the AAMD Adaptive Behavior Scale was being used. Interviews were conducted with parents of mentally retarded children, teachers and professional workers to gain an understanding of the cultural demands typically placed on children in India. Several differences from Western countries were noted. For example, in India eating is customarily done with the help of fingers with only occasional use of a spoon. The use of a knife and fork is either absent or limited to restaurants and westernized homes. Eating in public is much less frequent than in the West. Public eating is usually limited to drinking cold beverages and eating finger snacks. Having lunch or dinner in public is done only occasionally, starting at college age. In many parts of India, cleaning teeth is done with fingers or with a tender stem of certain trees. Travelling on unfamiliar journeys and long-distance travel by train or bus are not expected of boys and girls below age eighteen. Children usually depend upon their parents for money handling, budgeting and making purchases. Making use of bank facilities, using telephones and consulting a doctor for medical care are usually considered to be an adult's responsibility. Social res-

ponsibilities are only expected from boys and girls when they grow up and get married or work (Upadhyaya, 1974). Of course, the demands placed on children vary between urban and rural areas within a single country and between different Developing Countries. Mussen (1970) pointed out, for example, that in some folk and peasant societies, children often begin adult tasks as early as they are physically capable and usually perform adult subsistence roles quite competently before puberty. Thus, it is apparent that a test of adaptive behavior, ecologically valid for one environment, may not be appropriate for use in other countries nor in other areas of the same country. Furthermore, since very different kinds of adaptive behaviors may be required of children living in slum and upper socio-economic areas of the same city, different tests of adaptive behavior may be required for children living in each area.

Ecologically invalid test items can be found in a variety of tests. Hughes (1986) reviewed various tests for use in Sri Lanka: the Portage Guide to Early Education Checklist (Bluma, Shearer, Frohman & Hilliard, 1976), the Progress Assessment Charts (Gunzburg, 1974), the PIP Developmental Charts (Jeffree & McConkey, 1976), and the Behavioral Assessment Battery (Kiernan & Jones, 1977). Hughes found that many of the items in these tests were not appropriate to the vast majority of children in Sri Lanka. For example, some of the items related to dressing with shoes and socks, using a toilet and bath, using a washing machine and vacuum cleaner and cooking food on a grill. None of these activities was common to Sri Lanka.

Two tests commonly adopted for use with handicapped children in Developing Countries are the Portage Guide to Early Education (Bluma, Shearer, Frohman & Hilliard, 1976) and the Denver Developmental Screening Test (Frankenburg, Dodds, Fandal, Kazuk & Cohrs, 1975). Both of these tests assess performance of a number of tasks that are not ecologically valid in most Developing Countries; the tasks are not functional; they are not required in most Developing Countries. Some of these tasks are: building a tower of blocks, putting pegs in a pegboard, constructing picture puzzles, drawing a line through a maze, pushing three blocks in-line like a train, putting together a four-part nesting toy, stacking five or more rings in order of size on a peg, putting together two shapes to form a whole, and finger play with words and actions, such as, "Itsey-bitsy Spider Man." Most of the test items on the Denver Developmental test are very heavily influenced by culture, for example: playing "pat-a-cake"; playing ball or "peek-a-boo" with the examiner; scribbling and copying with a pencil; building towers and bridges with blocks; drawing a picture of a man; kicking, throwing and catching a ball; and speaking.

Inappropriate norms

Obviously the norms established for these Western tests will be quite inappropriate in a Developing Country where children have little, if any, opportunity to play with blocks, puzzles, pencils, and pegboards, etc. Given the high cost involved and the specialized expertise required, most

tests are not renormed. In most of the clinics in India, foreign tests are used with either original norms or with "impressionistically arrived" norms. (Presumably, impressionistic norms refer to the common practice of adding or subtracting some constant value to scores to adjust them to what an examiner *thinks* the scores ought to be). Needless to say, such norms do injustice to the children about whom a decision is made (Verma, Pershad & Randhawa, 1979).

In a culturally diverse country like India, it is impossible to produce a nationally normed test even with the use of the best possible sampling techniques (Kulkarni & Puhan, in press). In Western countries test standardization requires the selection of a representative sample of the population at large. Proportional sampling is done of each of the four or five broad categories of socio-economic status of the national population living in various regions (Serpell, 1984). In a country having the huge socio-economic, linguistic, cultural and geographic differences of India, standardization of this type would be extremely difficult and of little practical value. The norms derived would represent a hypothetical average of an extremely heterogeneous population and would, therefore, represent no single person or group of people within the population. One alternative is to develop separate norms for each of the separate subgroups for which norms are desired. This approach, however, is extremely expensive. Furthermore, as mentioned above, because of the various differences between these groups, in many cases, it may be more appropriate to develop separate, ecologically valid tests for each group rather than simply renorm a single test.

Using out-of-date tests

A number of the tests currently in use in Developing Countries are not worth renorming or modifying. Many of these tests continue to be used long after they have been abandoned in the country from which they were borrowed (Kulkarni & Puhan, in press; Sinha, 1984). For example, Wig, Verma and Pershad (1983) recommended use of the following tests as a measure of intelligence: the Vineland Social Maturity Scale (Doll, 1953; Malin revision), the Sequin Form Board, the Gesell Drawing Test (Gesell, 1949) the Porteus Maze, and the Draw-a-Person Test. According to Pershad, Verma and Randhawa (1979) the form board, drawing and maze tests are used because they are assumed to be culture fair.

The Sequin Form Board is frequently used all over India as a measure of intelligence in young children because it requires less time to use than other tests. The norms used for the Sequin Form Board are those established by Grace, Arthur and Phillips, reported in a book by Cattell (1946), (Verma, Pershad & Randhawa, 1979). In general, the Sequin Form Board is not often used in the Western world and is not generally considered to be a valid measure of intelligence.

After an extensive review of tests used throughout India, Wig, Pershad and Verma (1974) wrote that they did not have much faith in the so-called *culture fair* tests particularly in the field of intelligence testing. Intel-

ligence tests measure certain abilities required for success in the particular culture in which they were developed. According to Sattler (1982), author of one of the most authoritative textbooks on the assessment of children's intelligence and special abilities, every test is culturally loaded. Tests such as the Progressive Matrices, digit span memory tests, and the maze tests are culturally reduced because they are less dependent on exposure to specific language symbols. However, even these types of tests have some degree of cultural loading—they are not culture fair or culture free (Sattler, 1982).

The extremely culturally biased Vineland Social Maturity Scale has not been generally used in the West as a measure of intelligence for many years. Recently, the Vineland scale was revised as the Vineland *Adaptive Behavior* Scales (Sparrow, Balla & Cicchetti, 1984). Sattler (1982) did not review the infrequently used Porteus Maze test, but did review the parallel, supplementary Mazes subtest on the Revised Wechsler Intelligence Scale for Children (Wechsler, 1974). Sattler reported that the Mazes provided a poor measure of general intelligence, and that only 20% of a score obtained on the test was influenced by general intelligence.

One of the reasons the outdated form board, drawing and maze tests continue to be used is that they provide a tool to the limited number of trained psychometric personnel, who, overtaxed with large case loads, have little time to administer longer, possibly more valid tests. In fact, psychologists operating in many clinics do not even have enough time to establish rapport with children before testing begins (Mehta, 1978). The desire to save time has even driven some psychologists to substitute intelligence testing for parents' responses to two brief questions. Pershad and Kohli (1983) asked parents of children referred to a clinic for intelligence testing to answer the following questions: "Do you think your child can do all those activities which other children of his age group in your locality can do? If not, tell us to what age level is he compatible?" The parents' answers were compared to the results obtained on the Vineland Social Maturity Scale, the Sequin Form Board, the Gesell Drawing Test and/or the Malin Intelligence Test. The authors concluded that "these two simple questions can be substituted to some extent to know about the intellectual functioning of the child." Actually, although there may have been an acceptable agreement between the parents' estimates and the test results, neither the parents nor the tests may have provided a valid measure of the complex nature of intelligence.

Problems Associated with Western Methods of Testing

Testing is a complex process. There are a number of problems inherent in many of the methods of testing commonly used in the Western world. Unfortunately, many of the limitations of Western methods of testing are being adopted in Developing Countries that can least afford to use ineffective methods.

Norm referenced tests

Norm referenced achievement tests are designed to provide a score to represent a person's achievement in a particular area of performance such as reading or mathematics. The person's score on the test is interpreted by comparing it with the scores obtained by other people who have take the same test. These are the people in the *norm group*. For example, suppose that the National Board of Education in a particular country had developed a mathematics test for the 7,000 children throughout the country who were in the third year of school. The Board would then give the test to a limited *sample* of rural and urban students (e.g., 650), carefully selected to represent the variations among the 7,000 children. If the 650 students were well selected, their scores would represent the distribution of scores that the 7,000 students would have received had all of them been tested. The scores obtained by the 650 children are called the *norms*. The score on the arithmetic test received by any child in the country in the third year of school can be compared to the scores obtained by the students in the norm group. Comparison with these scores indicates whether the student's score is average, above average or below average and by how much the score differs from average. Several limitations of norm referenced achievement tests are described below.

a. Norm referenced achievement tests are designed for average children, studying average curriculums in average classrooms within a particular geographic region. These tests frequently do not provide a valid assessment of the achievement of handicapped children using modified curriculums in special programs.

   Typically, during the development of norm referenced achievement tests, test items are included that are most representative of curricula in average classrooms within a region. As a result, test items that are unique to individualized or special programs are eliminated from the test. Usually, a test item is kept in a test if 40-60% of the students in the norm group pass the item. Therefore, test items that most students (more than 60%) pass are removed from the test. Thus, potentially valuable information about low performing students is eliminated from the test. Often, a selection is made of those test items that best discriminate between the top 27% and the bottom 27% of persons in the norm group. As a result, once again, potentially valuable information about low performers is removed from the test. Thus, norm referenced achievement tests may test some skills that are not taught in special education programs, and may fail to test a number of skills that have been taught. As a result, norm referenced achievement tests may be least useful to the students for whom testing is most important—students in special education (Baine, 1986b).

b. During construction of a norm referenced achievement test, items are usually *randomly* selected from areas of the curriculum that are common to the largest number of classrooms. It is not considered necessary to assess all of the skills taught as there may be a considerable number. Instead, only a limited and representative number of skills are tested. Thus, after all skills within a particular area are defined, a random and representative selection of these skills is chosen for the test. Because of the random nature of item selection, all skills within a particular area of a curriculum may not be tested. As a result, test performance may not reveal which particular skills an examinee does or does not have. Also, because many of the skills tested are frequently assessed by only one or two test items, the ability to perform any specific subskill cannot be reliably determined. Passing or failing one or two items may reflect the presence or absence of a particular skill. Alternatively, performance on one or two test items may be influenced largely by chance errors, momentary distraction, or guessing. In general, the more times each skill is tested, the more *reliable* (less influenced by chance) the total score will be. Testing a skill with only one or two test items does not usually provide a highly reliable measure of the particular skill being tested. Because of the influence of chance, a correct or incorrect response to a single test item cannot be reliably interpreted to indicate the presence or absence of a particular skill. Also, when an examinee makes a relatively large number of errors of a certain type, the errors may indicate either the presence of a particular deficit, or the existence of relatively more test items of that type in the test, and therefore, more opportunities to make errors of that type. *Thus, norm referenced test cannot be used diagnostically.*

   In review, because a) not all skills within a particular area of performance are tested, and b) those skills that are tested may not be represented by a sufficient number of test items to provide a reliable measure of the skill, it is not possible to review an examinee's performance on individual test items within a test to identify his particular strengths and weaknesses. Perhaps the student's strengths and weaknesses were not even assessed in the test. Perhaps the tests items the student did perform incorrectly reflect testing error rather than student error. To focus remediation on the wrong skill is to waste valuable time and effort.

c. Norm referenced tests are often recommended as a method of placing students in the appropriate level of instruction. However, serious placement errors can be made when placements are made on the basis of norm referenced tests. Two students with the same total score on a test may have correctly answered different

test items. These students may have different strengths and weaknesses and possess different prerequisite skills. Two students, one in the first year of school and the other in the fifth year, may receive the same score, equivalent to the average student in the third year of school. Obviously, however, these students should not be placed in the same instructional group. One child's achievements are advanced, while those of the other child are retarded. Thus, these students may have different strengths and weakness, as well as different rates and styles of learning. According to Becker and Engelmann (1976), placements made on the basis of norm referenced achievement scores may be in error by two years or more. Additional limitations of norm referenced tests are discussed in Baine (1986b). Criterion referenced tests are discussed in the following chapter and in Baine (1986b).

Developmental tests

Tests and curricula designed for normal preschool children and for older children functioning at preschool levels are frequently based on the normal sequence of development of children in Western countries. There are a number of limitations inherent in this approach. First, if a child's development is significantly influenced by experience, and if that experience is frequently suboptimal (there is no screening test or training for parenthood), then the observed normal sequence of development in Western countries may not be optimal. Secondly, if children in different cultures receive different experiences that shape their development, then there may be variations in the rates and types of development. Children in Developing and Western countries and in rural and urban areas of the same country may develop some of the same skills but at different rates, and they may develop some unique skills related to their particular environments. These children may also perform the same skills in different ways. Third, handicapped children, because of their sensory, physical and/or intellectual deficits, may have different experiences than normal functioning children. As a result, they may be delayed in their development of some skills. They may fail to acquire other skills. They may learn some skills in an unusual order, and they may learn some unique compensatory skills. As a result, the Western, normal developmental sequence used as the basis of many curricula and tests may not be suitable for children in different cultures, may not be suitable for the unique development of handicapped children, and may not even be optimal for normal functioning children in Western countries. This controversial topic is further discussed by Adelson and Fraiberg (1975); Baine, (1986b); Guess, Sailor and Baer (1976); White and Haring, 1978; White (1980a, 1980b).

If instructional programs teach skills according to a student's level of development on a normal developmental sequence, several difficulties may arise. For instance, when a mentally retarded student is taught skills that relate to his mental age rather than to his chronological age, he is not

taught skills that are functionally related to his current environmental demands. Why must children unable to feed, dress and toilet themselves be taught colors, shapes, numbers, puzzles and pegboards (Burton, 1981)? Are the tasks, usually listed in a normal developmental sequence, prerequisite to the acquisition of functional skills? No! Children may become quite proficient at pegboards and puzzles, and not exhibit any improvement in their rate of learning functional skills.

When remediation focuses on a student's mental age level, when the student learns at a slower rate than average, she/he will not only remain behind the development of his/her peers of the same chronological age, but will also fall even further and further behind. As repeatedly demonstrated by Brown (1979) and his colleagues at the University of Wisconsin, it is possible to develop curricula to teach chronological, age-appropriate and functional curricular content to severely handicapped adolescents and young adults. In terms of mental age, in the past these students would usually have been given tasks like matching block designs, stringing beads and putting pegs in a pegboard, skills commonly included in a curriculum based on the normal developmental sequence. Instead, students of this nature have been taught age-appropriate, functional skills like food preparation, telephone use, shopping, bus riding and vocational skills (Baine, 1986b; Snell, 1983).

Adapting tests for handicapped persons

Tests administered to handicapped persons are frequently modified in the following manner: large print is used for visually handicapped persons; sign language is used with hearing impaired persons; test questions are read to blind persons or printed in braille; the time allowed for completing the test is extended; some test items are changed (e.g., if an item is unnecessarily difficult for visually impaired persons, because visual stimuli are used to measure knowledge learned through other senses); the test is given individually to distractible children rather than to a group. Despite the history of these changes, there have been few empirical studies of their effects on the resulting scores, or on the *reliability and validity* of the tests. Reporting scores from nonstandard test administrations without special identification (often called "*flagging*" of test scores) violates professional principles and perhaps harms handicapped persons whose scores do not accurately reflect their abilities (AERA, APA & NCME, 1985). The greater the number and/or nature of adaptations made to a test, the less *standardized* the *administration* becomes and the less acceptable the use of the norms.

Clinical and in situ testing

During clinical testing an examinee is often expected to demonstrate his/her best abilities to a stranger (the examiner) during a short-term, high intensity interaction in an unfamiliar environment (a clinic). The performance of handicapped children is often greatly influenced by the environment, and their behavior is frequently quite changeable from place

to place. As a result, the brief nature of a clinical assessment and the artificial nature of the situation sometimes reduces the validity of the test. The test results may not accurately represent an examinee's typical performance under the usual range of conditions that occur in the natural environment. For example, some behaviors may appear in the clinic that are not usually seen in the natural environment. Alternatively, some behaviors seen under natural conditions may not be observed in the clinic. Behaviors common to both environments may become distorted and increase or decrease in frequency, duration and/or intensity in the clinic. Thus, it is possible that remedial programs designed on the basis of a clinical assessment may try to correct problem behaviors that occur only in the clinic and not attempt to remedy serious problems seen only in the natural environment. Furthermore, remedial methods that may seem to be effective during a brief clinical evaluation may not be as effective under the variety of conditions found in the natural environment.

In situ testing is the *repeated* assessment of a person's skills in the natural environments in which she/he would most usually be required to perform now and in the future. Because the test is repeated several times, the results are likely to be more *reliable* than those of a clinical test. Because the test assesses performance under a variety of usual variations of conditions in the natural environment, the test results will likely be more *valid* than those gained from a clinical test. An in situ test is designed to assess the usual variations in a person's performance under the typical range of natural environmental conditions. In situ testing permits the repeated assessment of the relative effectiveness of various types of teaching methods and materials in the natural conditions in which they must eventually be used.

As it may not always be convenient to test a person's behavior repeatedly under natural conditions, *simulated testing environments* may be used. For example, rather than test an examinee's behavior in an actual market, one or two stalls of a simulated market could be built. However, the greater the differences between real and simulated conditions, the less representative an examinee's behavior may be.

Kulkarni and Puhan (in press) have described an interesting in situ testing program operated by the National Institute of Bank Management in India. In some banks, small group exercises are conducted to select people for promotion. In these exercises, the tasks involve group discussion of certain themes, prioritization and in-basket exercises. These activities simulate the problem solving, decision making and other types of work usually done by administrative personnel.

Recommendations

Instructional validity

Many tests are used that have little if any relevance to instruction (Kulkarni & Puhan, in press). Instructional validity refers to the degree to which a test assesses abilities taught with a specific instructional program

or that are relevant to the choice among alternative instructional programs. According to Kulkarni and Puhan, the intent is to require that all educational tests be evaluated in terms of their contributions to instructional decision making. Do the tests help teachers to make choices among different instructional programs? Do the tests results show the effectiveness of different instructional methods and materials?

Ecological validity

It is important to develop culturally appropriate tests with specific, local norms that can be used on the majority of our clinic population which is rural, semi-literate and unsophisticated in the use of Western methods of testing (Wig, Verma & Pershad (1983). We need tests that are designed to solve specific problems, for specific target groups in particular locations (Kulkarni & Puhan, in press).

When Western tests have been adapted for use in a Developing Country, the ecological validity of the test must be evaluated. The cultural appropriateness of the content, the stimulus and response formats, and the methods of test administration should be assessed for the particular region where the test will be used. Tests, ecologically valid in one country or region in a country may not be valid for use in other areas.

The prescriptive focus of the type of assessment we have advocated also carries the implication that it must include an analysis of the clients' social environment, the home, the neighbourhood, the community and the cultural context (Mittler & Serpell, 1985). In essence, these authors are recommending use of an ecological inventory for designing tests.

Norm and criterion referenced tests

Criterion referenced tests, discussed in the next chapter, are recommended over the use of norm referenced test for most educational purposes. Norm referenced tests have a number of limitations: a) in most cases, the norms established in Western coun-tries are not valid for use in Developing Countries; b) in heterogeneous countries like India, the norms established for one social, cultural, eco-nomic, linguistic and geographic region may not be valid for use in another region within the same country; c) the costs of establishing separate norms for each region may be prohibitive; d) because of the manner in which norm referenced tested are constructed they cannot be used diagnostically to identify an examinee's strengths and weaknesses; also, the tests may be least useful for students for whom testing is most important—students in special education; and e) students having the same score on a norm referenced test may have different strengths and weaknesses, as well as rates and styles of learning; thus, norm referenced achievement tests cannot not be used to place students into instructional programs.

In situ testing

Kulkarni and Puhan (in press) recommended the use of situational or in situ testing. Gardner, Karan and Cole (1984) recommended that assess-

ment should be conducted in situations and under conditions that closely approximate the environments in which the person will be placed following examination and training. Assessment should be conducted over a sufficient length of time to ensure a representative sample of the person's characteristics. The assessment should include samples of both typical and atypical behaviors under various conditions. Assessment should also include an evaluation of the effectiveness of various methods of treatments or instructional techniques.

Translated tests

When a test has been translated from one language or dialect to another, the validity and reliability of the revised test must be evaluated on the linguistic group with which the test will be used (AERA, APA & NCME, 1985). When a test has simply been translated from one language or dialect to another, the appropriateness of the content, the familiarity of the concepts and the suitability of the language must be evaluated.

Giving tests in English to people who speak English as a second language

When tests in English are administered to persons who speak English as a second language, and who may not have had substantial exposure to the type of English used in tests, test results should be interpreted with caution as they may not accurately reflect the abilities being tested (AERA, APA & NCME, 1985).

Adapting tests for persons with handicaps

Caution should be exercised when tests have been adapted to accommodate persons with handicaps. Changes that have been made that may affect the score should be clearly identified so that anyone interpreting the test results can evaluate the effect of the changes. When the effect of the changes on the validity and reliability of the test made have not been formally evaluated, test norms should be used with caution, *if at all.*

Culture fair tests

Substantial evidence exists showing that all tests are culturally biased; every test is culturally loaded. The cultural loading of some non-verbal tests may be reduced; however, there is no such thing as a culture fair or culture free test.

Chapter Ten

Functional Testing

The goals of the following chapter are to:

a. discuss the nature of functional testing, instructional validity, intelligence testing, achievement and diagnostic testing;
b. describe methods for designing functional, criterion referenced tests;
c. provide examples of ideal, criterion referenced tests; review their characteristics;
d. discuss methods for approximating the ideal;
e. describe the nature of curriculum based assessment (CBA) and methods for developing CBAs;
f. review the nature of informal checklists as a basis for developing criterion referenced tests and curriculum based assessment;
g. describe a practical, biweekly assessment and planning guide; and
h. discuss a number of considerations that should be made in the adoption of tests from other countries or from other regions in the same country.

Functional Testing Defined

Functional testing involves testing functional skills. Functional skills are the skills required to perform routine daily activities, as well as academic, recreation, communication and social tasks. These are the tasks people living in particular current and future home, community, school and vocational environments are required to perform.

Functional testing involves testing skills that have direct instructional relevance (*instructional validity*). Instructional validity refers to the degree to which a test assesses skills taught within a specific instructional program or that are relevant to the choice among alternative instructional programs (Kulkarni & Puhan, in press).

Some people think it is important to test the intelligence of students, particularly mentally retarded students. Some people think that a student's intelligence predicts what the student can learn. These people use the results of intelligence tests to place students in educational/training programs. These people are wrong! In the past, it was common to describe students with IQs below 50 as "trainable." These students were not considered educable (IQ over 50) and were not put into educational programs. As a result, they did not learn educational skills and the people who had classified them as ineducable were happy with their ability to

predict what could be learned. Today, in many parts of the world, "trainable" mentally retarded students are attending regular schools. They are learning many academic skills. Today, in many parts of the world, severely and profoundly mentally retarded children (previously referred to as "custodial" and kept in institutions) are attending regular schools. These students are learning many skills people who use intelligence tests never thought would be possible for them to learn. How much can a person with an IQ of 55 learn? The correct answer to this question depends not simply on the person's IQ but on a variety of other factors. Some of these factors are the skills the person has already learned, the person's current and future state of intellectual and sensory functioning, and the appropriateness of the educational program. How should a person with an IQ of 55 be taught? No one can answer this question without actually trying to teach the particular person in question. Teaching is a very complex task. Handicapped people are sometimes very difficult to teach. For any handicapped person, it takes considerable time, effort, and skill to determine the best way to teach particular skills. With what students should a person with an IQ of 55 be placed for instruction? The answers to this question depends upon the skills the student has already learned, the skills he or she is ready to learn, and his or her rate and style of learning. None of this information can be gained from an intelligence test.

The evidence strongly indicates that a student's intelligence (IQ) is educationally irrelevant. A person's IQ will not indicate what skills the student already knows, what she/he can learn, how he/she should be taught, nor what group of students he/she should be placed with. Functional testing involves testing skills that have direct instructional relevance. Intelligence testing is not functional testing.

Functional testing can be used to assess a student's achievement (the number of *particular* skills learned). In norm referenced tests, a student's achievement is represented by a score. As was discussed in the previous chapter, students with the same score may have learned different skills. They may have different strengths and weaknesses. Criterion referenced tests, discussed later in this chapter, do not represent achievement by a score. Criterion referenced tests indicate which *particular* skills a student has learned. Criterion referenced tests may be used to make *placement decisions*. Placement decisions involve placing a student with other students who have learned the same skills.

Functional testing can be used for *diagnosing* a student's learning problems. Achievement testing indicates which problems on a test a student got correct or incorrect. Achievement testing does not indicate why the student made errors. As was discussed in the previous chapter, norm referenced achievement tests do not test all of the skills within an area of performance; therefore, the results of the test do not indicate which *particular* skills a student has or has not learned. Also, because each skill tested on a norm referenced achievement test is usually assessed by few test items, the assessment of individual skills may not be reliable. That is,

the student may have performed the items incorrectly because she/he has not learned the required skills. His/her performance may also have been influenced by *chance influences* such as a brief distraction, a careless mistake, fatigue at the end of the test or guessing. In contrast, diagnostic tests use several test items to assess each skill. Because there are more items to test each skill, performance is less influenced by chance. Thus, each skill is tested more reliably than on an achievement test. The results of diagnostic tests indicate for each student whether the skills tested are relative strengths or weakness. Given diagnostic information of this nature, teachers can design suitable remedial programs. Examples of criterion referenced diagnostic tests are discussed later in this chapter.

Designing Functional Criterion Referenced Tests

The following discussion initially describes ideal methods of testing. As some of these methods may not be immediately adopted, they may represent long-term goals to work toward. Practical, intermediate methods of testing that can be readily adopted are also described.

A criterion referenced test lists all of the skills required to perform a particular task(s). Each of the skills is described in the form of an *objective.* Each objective is defined in terms of conditions, performance and *standards (criteria).* A student passes the objective (demonstrates that he/she has particular skills) if he/she can *perform* under the *conditions* described, to the specified *criteria.* Thus, *the objective is a criterion* that the student must achieve to demonstrate that he/she has learned a particular skill. The student's performance is compared to the objective, and is, therefore, criterion referenced.

As was discussed in the previous chapter, in a norm referenced achievement test, an examinee's performance (score) is compared to the scores of people in the norm group. Thus, the results of a norm referenced achievement test indicate if an examinee's score is at, above or below the average score of examinees in the norm group. The score will also indicate how much the score is above or below average. In contrast, in a criterion referenced achievement test each student's performance is compared to the criteria stated in a number of objectives each describing skills required to perform a particular task. The results of a criterion referenced achievement test indicate which particular objectives (skills) the examinee has passed (learned).

An *ideal* criterion referenced test is designed in the following manner.

a. An ecological inventory is done to identify functional tasks a person is or will be required to perform in one or more environments.

b. A *terminal behavioral (instructional) objective* is written to describe each task. Each objective describes the task in terms of the conditions, performance and standards (criteria).

c. Each terminal objective is *task analyzed* to identify the skills that are required to perform the task described in the objective. These are

called the *enabling skills;* learning these skills *enables* a student to perform the task described in the objective.

d. Each enabling skill is described in the form of an objective with conditions, performance and criteria.

e. Each terminal objective and its enabling objectives are organized in the following manner.

Objectives		*Test items*
Terminal objective	*TBO*	a, b, c, d.
Modular objective	*MBO3*	a, b, c,
Enabling objective	EO33	a, b, c.
	EO32	a, b, c, d.
	EO31	a, b, c.
Modular objective	*MBO2*	a, b, c, d.
	EO24	a, b, c, d, e.
	EO23	a, b, c.
	EO22	a, b, c.
	EO21	a, b, c.
Modular objective	*MBO1*	a, b, c.
	EO12	a, b, c.
	EO11	a, b, c, d.

All of the enabling objectives ("EOs" describing the skills required to perform the task described in the terminal behavioral objective "TBO") are listed below the TBO. Skills related to each other are grouped together and a modular behavioral objective "MBO" is written to describe the related skills listed below it. In the sequence shown, there are three modules of skills; three sets of related skills.

f. Test items (a, b, c, d and e) are written for each objective. The fewest items necessary to provide a reliable measure of the particular skills being tested are written.

A criterion referenced test of this type can be used in several ways. The test may be used for screening. *Screening* provides a brief review of a student's achievements. To use the test for screening, a student would first be asked to perform the test items a, b and c for MBO1. Performance on these test items would provide a quick estimate of the student's ability to perform the skills described in enabling objectives 11 and 12. Next, the student would be asked to perform test items a, b, c and d for modular objective two MBO2. Performance of these items would provide a quick estimate of the student's ability to perform the skills described in enabling objectives EO21, 22, 23 and 24. The student would then be asked to perform the test items for enabling objective three. Finally, the student would attempt the test items for the terminal behavioral objective TBO. Performance of the terminal objective test items indicate the ability of the student to perform the task for which all the enabling skills are prereq-

uisite. The results of the screening test provide a brief indication of the subject's ability to perform the skills listed in the sequence.

The criterion referenced test may also be used as an *achievement test* to identify the particular skills a student does or does not possess. Achievement testing is done in the following manner. The student is asked to perform the test items for MBO1. If all of these items are performed correctly, the student is asked to perform the test items for MBO2. If the student fails to perform all of these test items to criteria, she/he will be asked to perform the test items for EO21, then EO22 and so on. Performance on these test items will indicate which of the enabling skills the examinee is able/not able to perform to criteria.

The criterion referenced test may also be used as a *diagnostic test*. Diagnostic testing is done in the following manner. When the test is initially made, all of the errors possible on each test item may be classified as to type. For example, on a module related to multiplication of numbers, if the answer given to the problem 35 x 486 is 25,758, the error would be classified as a placement error. For example, 5 x 486 is 2,430 and 3 x 486 is 1,458; the number 1,458 had been incorrectly placed under 2,430 when solving the multiplication problem. Thus, the results of the diagnostic test will indicate the specific type of remedial skill training required, e.g., teaching proper placement. The *Enright Diagnostic Inventory of Basic Arithmetic Skills* is a criterion referenced achievement/diagnostic test. This test is reviewed in greater detail later in this chapter.

Examples of Ideal Criterion Referenced Tests

Time telling program

A module of a criterion referenced test on telling time from a clockface is shown below. There are 10 enabling skills in the module. Each enabling skill is written in the form of a enabling behavioral objective. The modular behavioral objective is shown between dashed lines.

MBO1 Given a clockface without hands, and two lines pointing to any random numbers on the clockface, on request silently count to the first number by ones; silently count to the second number by 5s; do not touch any numbers counted; say both numbers aloud in the form 6:20. Criteria: except for the last 1s and 5s numbers counted, no other numbers should be stated aloud; numbers stated aloud should be in the correct order e.g., 6:20; no numbers counted should be touched; on 8/10 trials, both of the final two numbers stated should be correct.

EO110 Given a clockface without hands, and when a line points to any random number on the clockface, on request silently count by 5s from 5 to the number the line points to; do not say aloud the numbers counted; do not touch the numbers counted, say aloud

the last number counted. Criterion: state only the last number counted: 8/10 trials correct.

EO19 Given a clockface without hands, on request count by 5s each of the numbers from 5 to any randomly indicated number less than 60; touch each number as it is counted. Criteria: all numbers must be touched as they are counted; counting: 8/8 trials correct.

EO18 Given a clockface without hands, on request count by 5s each of the numbers 1 to 11 as 5 to 55; touch each number as it is counted. Criteria: must touch all numbers as they are counted; counting: 6/7 trials correct.

EO17 Given a request, rote count by 5s from 5 to any randomly stated number from 10 to 55. Criterion: 6/7 trials correct.

EO16 Given a request, rote count by 5s from 5 to 55. Criterion: 4/5 trials correct.

EO15 Given a clockface without hands, when a line points to any random number on the clock face, on request silently count by 1s from 1 to the number the line points to; do not touch the numbers counted; do not say aloud the numbers counted; say aloud only the last number counted. Criterion: state only the last number counted: 8/10 correct trials.

EO14 Given a clockface without hands, on request, count by 1s each of the numbers from 1 to any randomly indicated number less than 12; touch each number as it is counted. Criteria: all numbers must be touched as they are counted; counting: 8/8 trials correct.

EO13 Given a clockface without hands, on request count by 1s each of the numbers 1 to 11; touch each number as it is counted. Criteria: must touch all numbers as they are counted; counting: 6/7 trials correct.

EO12 Given a request, rote count by 1s from 1 to any randomly stated number from 2 to 11. Criterion: 6/7 trials correct.

EO11 Given a request, rote count by 1s from 1 to 12. Criterion: 4/5 trials correct.

If an examinee failed to reach criteria when being tested on MBO1, testing would begin on EO11. Testing of each of the successive EOs would continue so that each of the skills the learner could or could not perform was identified. Testing would stop when the examinee failed to reach criteria on three successive enabling objectives. Testing of this nature would indicate the examinee's level of achievement and the skills to include in his or her teaching program.

Enright Diagnostic Inventory of Basic Arithmetic Skills

The Enright (Enright, 1983) provides an excellent example of an ideal criterion referenced test. This test is relatively free of cultural bias and may be used in Developing Countries. The materials cost approximately $(US)85.00. The test also serves as an excellent model for the design of other ideal criterion referenced tests. The test is individually administered. The basic arithmetic skills have been task analyzed to provide a diagnostic measure of 144 basic computational skills. The skills tested are: addition, subtraction and multiplication of whole numbers, fractions and decimals. These are the computational skills taught in the first nine years of school in North America. Each skill tested is very clearly defined. The skills are sequenced in order of difficulty. As a result, the test indicates the order in which the skills should be taught. There are placement (screening) tests indicating where to begin in-depth testing. For each skill tested, a very clear explanation is provided of each of the types of errors that can occur. Examples and explanations of 233 different types of errors are identified in the test. A practice and review series of exercises corresponding to the skills assessed in the test are also available. This material costs approximately $(US)100.00.

Unfortunately, few criterion referenced tests are ideal. Few tests are built on the basis of task analysis to identify the enabling skills required to perform the task described in the objective. In fact, for most criterion referenced tests, test items are selected in the same manner as they are for norm referenced tests—random selection of items from a specific area of performance. The two major differences between criterion and norm referenced tests of this type are a) each skill evaluated on the criterion referenced test is described in terms of a "behavioral objective," and b) the criterion referenced test is usually not normed. Unfortunately, too, the behavioral objectives of many of these criterion referenced tests are very poorly written. The following objective describing a classification task is typical.

> Separates similar objects into categories (three different chairs, three different tables, etc.) with 85% accuracy.

This "objective" has several weaknesses. First, the objects to be separated are not adequately described. Of course, there are differences between tables and chairs, but the objective does not state whether there are also differences among the tables and among the chairs. How similar are the chairs to each other, and how different are they from the tables? Obviously, the number and degree of identical, similar and different characteristics among and between categories will significantly influence the difficulty of the task. In the objective, the term "etc." indicates that one may include various sets of objects to be separated. These objects may be more or less difficult to separate than the tables and chairs. The standard of 85% is quite arbitrary. What is the minimum essential standard of performance required before going to a higher level of performance?

How is the accuracy judged? If a single object is misplaced in a set, is the entire trial considered to be wrong, or are points given for correctly sorted objects? Is it acceptable to get 85% correct on each trial or 85% correct out of 100 trials? Objectives of this nature leave too much room for subjective interpretation. Thus, the nature of the task, its difficulty, and the criteria by which it is judged may vary from teacher to teacher. Different teachers using the same objective may teach and test different skills (Baine, 1986b). The Brigance series of tests, popular in North America, are examples of poor "criterion referenced tests." These tests are reviewed in Baine (1986b).

The Characteristics of Ideal Criterion Referenced Tests

It is apparent that all criterion referenced tests are not created equal. Some criterion referenced tests are ideal in design; others are quite unsatisfactory. Therefore, it is necessary to be careful when designing a criterion referenced test or when selecting an already made test. To aid the building and selecting of ideal criterion referenced tests, their ideal characteristics are listed below.

a. The tasks described in the terminal behavioral objectives are functional.

b. The enabling skills have been identified by a task analysis of the task described in the terminal behavioral objective.

c. All tasks and skills are described in the form of behavioral objectives with conditions, performance and criteria. *Each objective should be written with enough detail so that each of a group of competent teachers independently using the same objectives would teach and test essentially the same skills.*

d. There should be enough test items for each objective to provide a reliable measure of an examinee's ability to perform the skills tested. As a rule, there should be at least three test items measuring each skill being tested. An examinee should get essentially the same score on each of the test items measuring the same skills. *Reliability* is a measure of the consistency with which test items assess an examinee's performance. Poor test items are influenced by chance variations (error of measurement) and have low reliability. Good test items are less influenced by chance error and have higher reliability. There are several different statistical methods for estimating the reliability of test items. Readers interested in studying the topic of reliability and test construction are referred to the following texts. Popham (1981) *Modern educational measurement*: reviews the nature of criterion and norm referenced tests, test building and administration, and reliability and validity. Mehrens and Lehmann's (1984) *Measurement and evaluation in education and psychology* also reviews

norm and criterion referenced tests, reliability and validity as well as teacher made tests.

Approximating the Ideal

Obviously, it is difficult to develop ideal criterion referenced tests. Considerable, time, cost and expertise are required. Nevertheless, it is possible to approximate the ideal.

a. Rather than conduct an ecological inventory, simply identify functional tasks to teach and test. See Chapter Three for Suggestions for Adopting an Ecological Inventory Approach to Curriculum Development.

b. Rather than do a complete task analysis to identify each enabling skill, do a partial task analysis to identify the major skills as represented by modular objectives. The task analysis of important or problematic areas can be extended later.

c. Rather than write detailed behavioral objectives, write abbreviated objectives to be expanded later. See Chapter Three for a discussion of various types of behavioral objectives.

d. Whereever possible, adopt a curriculum based approach to assessment. Curriculum based assessment is discussed in the next section of this Chapter.

Curriculum Based Assessment

Curriculum based assessment is the process of getting direct and frequent measures of a student's performance on a series of sequentially arranged objectives taken from the curriculum used in the classroom (Blankenship & Lilly, 1981). Simply stated, curriculum based assessment involves testing the skills taught in a specific curriculum. Curriculum based assessment is an alternative to using norm referenced achievement tests that may not test the same skills as are taught in a specific curriculum. This problem is particularly important to handicapped students who may be taught with a modified curriculum. In the curriculum based approach, testing and teaching are not independent activities. Testing and teaching are complementary, ongoing activities. Frequent testing helps a teacher make instructional decisions. Curriculum based tests can be prepared for any curriculum, for example, mathematics, reading, spelling, vocational, life skills, etc. Curriculum based tests are developed and used in the following manner (adapted from Blankenship, 1985).

a. A particular curriculum is reviewed to identify the skills taught. Major and minor skills may be identified. A partial list of skills from one area in an arithmetic curriculum are listed below. Listing the page numbers helps to assign students requiring help with particular skills to the appropriate pages in the arithmetic book.

Major Skill Area: Addition

Skills	*Example*	*Page number in curric.*	*Total*
n ±n	3 ±2	22	30
no ±nn	30 ±22	23, 27	10
. . nnc ±nnn	239 ±445	27, 31	12
. . ccc ±nnn	784 ±968	29, 31, 32	13

b. The list of skills is reviewed to see if all important skills are listed. The purpose of this analysis is to determine if the skills to be tested are the same as the skills being taught. If there is not a suitable match, it may be necessary to add skills to, or delete skills from, the list.

c. The skills should be organized into categories of related skills. For example, the skills taught in the addition area of an arithmetic curriculum should be organized in the following categories: addition facts (3 + 2 =); addition not requiring "carrying" (52 + 21 =; and 324 + 123 =); and addition requiring carrying (59 + 7 =; 349 + 129 =). The skills in each category should be listed in the order in which they are taught.

d. An objective is written for each skill (major and/or minor) to be tested. These objectives may be quite brief, for example:

> Given 100 problems (n+n=__) in mixed order, write the answers getting 90% correct on 2/3 days.

e. Test items are written to test the skills listed in each objective. Sufficient test items should be written so that different (parallel) forms of the same test may be given at different times. Part of a 35 item curriculum based assessment for arithmetic is shown below. Several similar tests may be given on different days to get a reliable measure of each student's ability.

nn	21	34	67	85	60
±n	±4	±2	±2	±3	±6
.					
.					
nn	23	70	42	11	45
±nn	±34	±22	±54	±23	±32
.					
.					
nnn	532	336	440	354	802
±nnn	±264	±264	±323	±431	±134

f. The curriculum based test is given immediately before teaching the skills begins. Each time curriculum based tests are used, they may be given over several days. This approach provides students with many opportunities to try similar test items on different occasions. Thus, the test results will reflect the student's typical performance. The test results will also indicate:

   Which students have already learned the skills to be taught, which students have the prerequisite skills and are ready to learn the skills to be taught, which students lack the prerequisite skills and will require preparation before instruction of the skills begins.

g. The curriculum based test is given again immediately after instruction. The results of this test indicate:

   which students have learned the skills and are ready to move to a new topic of instruction, which students require more practice before moving to a new topic, and which students are not making adequate progress and require remedial instruction.

h. The same curriculum based test can be given at different times during the school year to assess retention of the skills taught.

Blankenship and Lilly (1985) provide examples of the development of curriculum based tests for arithmetic and reading. A special issue of the journal *Exceptional Children*, vol. 52, November, 1985 features curriculum based assessment. Howell and Morehead (1987) have published a textbook on the topic, *Curriculum-Based Evaluation for Special and Remedial Education.*

Informal Checklists

Informal checklists are a simple alternative to criterion referenced tests and curriculum based assessment. Well designed checklists can be a starting point in the design of criterion referenced tests (CRT) and curriculum based assessment (CBA). In both cases, once the skills to be tested are identified through either a task analysis (CRT) or an analysis of a cur-

riculum (CBA), each skill is briefly described in a few words rather than in the form of a behavioral objective. No test items are written. The checklist can be used in this manner. Later, the checklist can be improved describing the skills as behavioral objectives. Test items can be written for each objective. Several items from a checklist are shown below.

a. Draws a vertical line in imitation.
b. Draws a horizontal line in imitation.
c. Copies a circle.
d. Draws "+" in imitation.
e. Draws a V-stroke in imitation.

Test items of this nature may initially appear quite simple and easy to test and score. However, various teachers may test and score the same item in quite different ways. For example, item c. asks the examiner to rate if a child can copy a circle. Different examiners may *draw* a large, sample circle on the slate board, *draw* a small, sample circle on the student's paper, or present an already drawn picture of a circle. The type of sample presented may influence the type of response the student makes. Different examiners may score the student's "circle" as correct or incorrect if a. it is an oval, b. the ends do not meet completely, or they overlap, or c. the circumference line is not completely smooth.

Thus, although checklists provide a starting point for assessment, it is apparent that each of the test items should be well defined as soon as possible. Checklists have been developed for most areas of performance. Test items from a learning behaviors checklist are shown below. How would you define/interpret the words in italics? How would you test each of these items?

a. Is *attentive* during *most* activities.
b. *Rarely* pays attention.
c. *Prefers* information presented through the *auditory channel.*
d. Prefers information presented through the visual channel.
e. Has *little recall* of *most* information.

Obviously, checklists must be used with considerable caution. Nevertheless, they do have value. As mentioned, checklists can be used as a starting point in the development of better tests. In addition, a checklist, if reviewed occasionally by a teacher, may serve as a reminder to pay attention to particular behaviors. For example, a teacher reading item e. may be reminded to pay attention to a student's ability to recall particular types of information. The teacher may decide to test the student's ability to remember information. In addition, the teacher may begin to teach students how to remember information.

Biweekly Assessment and Planning Guide

Rather than use any formal tests or checklists, teachers can use a biweekly assessment and planning guide. The guide may also be used with other types of tests. The guide consists of sheets of paper with the titles of each area of instruction: home, school, community and vocational listed approximately 4 inches apart down the left side of each sheet. Each area, for example school, would be divided into subareas, such as, reading, arithmetic, eating, toileting, etc. Every two weeks, opposite each title, the teacher would list the instructional goals or objectives for a particular student for the following two weeks. For example, opposite the home environment category for one student, the following goals may be listed: use sand to extinguish an oil fire on the stove; care for cuts and wounds: clean, use antiseptics, stop bleeding, bandage and seek medical help when required; and store food and water away from insects and rodents. These are skills the teacher thinks the student can learn during the two-week period. Each student's planning sheets should be kept in a separate file folder. Sheets of paper should be available for describing the student's performance on each task, for example, the number of arithmetic problems correctly solved, the type of errors made in selecting fruit and vegetables at the market, the amount of time taken to husk ten coconuts, or the consistency of a batter used in cooking. Wherever possible, examples of the student's past performance in each of the areas of instruction should be kept in the file. For instance, copies of the student's writing, arithmetic calculations, and comments about the student's performance when spraying insecticide or when planting seeds should also be kept in the file. This information would be used to plan the goals and objectives for the next two-week period. An examination of the file would clearly show the student's achievements in each area. Rather than prepare the biweekly planning sheets for all students on the same day, a teacher might prepare them for one or two students each day. In classrooms with few students, biweekly assessment and planning guides could be kept for all students. In classrooms with many students, guides could be kept for a few selected students. The teacher may prepare guides for different students during various times of the school year. Preparation would involve collecting the best examples of each student's work in each area. In some areas, a brief test of performance may be given. Based on the information kept in the student's file, goals would be selected and recorded on the planning sheet. Each student's file would be reviewed on a bimonthly basis by the school principal or supervising teacher in consultation with the teacher. Both principal and teacher would date and sign the file indicating that the student's performance had been adequately tested and that appropriate goals had been selected and achieved, or that necessary changes (specified) had been made in the teaching procedures. The records contained in these files may be used to evaluate student progress and the appropriateness of placement in a special or integrated program. The files also provide an indication of teacher effectiveness (Baine, 1986a).

Guide to Test Selection

In spite of the problems involved, a lack of time, money and expertise and the availability of Western tests, tests developed in the West will likely be adopted. Thus, the following list provides a guide to *some* of the considerations that should be made when adopting an achievement test from another country or from another region in the same country. The guide provides a brief review of some of the topics discussed in the previous two chapters. There are other technical considerations that should be made in the selection. For a review of technical issues, the reader is referred to *Standards for Educational and Psychological Testing* (AERA, APA & NCME, 1985), and to *Assessment in Special and Remedial Education* (4th ed. Salvia & Ysseldyke, 1988). Many readers will likely be unable to answer some of the following questions and will be unable, therefore, to judge if a test is suitable or not. These questions should be taken to an expert. Testing is very complex and specialized technical assistance may be required.

a. Is the test *culturally biased*? Are the examinees familiar with using pictures of the type used in the test? Are the vocabulary and concepts used in the test (including the instructions) familiar to the examinees? Are the skills tested functional within the particular socio-cultural, economic, linguistic and geographic environment in which the examinees live? Are the examinees familiar with responding in the manner required on the test, for example, multiple choice, matching, fill-in the blank formats, and oral responses?

b. Is the test suitable for the particular type of *handicapped person* to be tested? Will an examinee's handicap unfairly influence his/her score on the test? For example, if the test is assessing language skills and examinees are required to write their responses, physically handicapped examinees with good language skills would be unfairly influenced by having to write rather than speak their responses. Similarly, students with limited vision would be unfairly influenced if an arithmetic test was printed in small type. The test may measure the examinee's limited vision rather than his/her arithmetic skills. Fuchs, Fuchs, Benowitz and Barringer (1987) state that test items may be discriminatory for a visually impaired child if they measure knowledge, skills or concepts learned primarily through vision or if the items use visual stimuli to measure knowledge acquired through other senses. Does the test allow enough time for handicapped people? People with some types of handicaps may require more time to take a test. Is the length of the test appropriate? Some people with handicaps may become very tired taking long tests. Generally, for handicapped students in the first three years of school, a test longer than 20 minutes is too long.

c. Is the test *suitably normed*? The test should be normed on the type of examinee for whom it is to be used. For example, if a test to be used with mentally retarded children, ages 6-12 years, living in rural areas of Kenya, it should be normed on mentally retarded children, ages 6-12 years, living in rural areas of Kenya. Any other norms are inappropriate. Note, however, that in North America most of the tests used with handicapped children have not been normed on handicapped children. Fuchs, Fuchs, Benowitz and Barringer (1987) reviewed 27 tests commonly used in special education in North America. Ninety-one percent of the test manuals reviewed provided no information on the nature and extent of handicapped students involved in test development. Many of the manuals also provided no evidence that the tests were valid for use with handicapped students. Note, also, that there are likely few, if any, tests normed on rural children in Kenya. Tests are tools; sometimes an inappropriate tool is better than no tool at all. However, one should be fully aware of the limitations of the tools he/she uses, the consequences of using inappropriate tools, and ways to minimize misuse. Are the norms recent? Sometimes skills in a population change significantly in a short time. For example, the language skills and general knowledge of people living in an area into which radio and/or television have been recently introduced would likely improve considerably in a relatively short time. A language test normed on these people before they had been introduced to radio and television would not be suitable for use with the same people three years after the introduction of radio and television; the norms would be out-of-date. Some norms are suitable for a long period of time, if the characteristic being tested has not changed significantly in the population on which the test was normed.

   If the test has been changed in any significant way since it was normed, has it been renormed? Have examinees in the norm group been suitably selected? If males and females can be expected to get different scores on the test, then a random sample of males and females should be selected for the norm group. If 55% of the people in the population are females, then the norm group should be proportional; 55% of the people in the norm group should be female. If Moslems and Christians, rural and urban people, people of different ages and different types of handicaps can be expected to perform differently on the test, then a random and proportional sample of these different people should be selected for the norm group.

d. Is the test *instructionally valid*? Does the test assess skills taught in a specific instructional program or that are relevant to the choice among alternative instructional programs. Will the test results help to place the student in a particular instructional program?

Will the test indicate which of the skills taught in a particular program a student has/has not learned? Will the test indicate with which skills the student needs remedial assistance? Will the test results help to select or modify a suitable method of teaching? Will the test results indicate in which instructional group the student should be placed? Will the test results help in the selection of appropriate instructional materials, for example, reading texts?

e. Is the test *content valid*? A content valid test assesses the knowledge and skills taught in a particular curriculum. When tests are being used to evaluate the effectiveness of a particular curriculum, teacher, teaching technique or student, it is necessary that the test assess all and only the knowledge and skills taught in that particular curriculum. Furthermore, it is necessary that the knowledge and skills be tested in the same manner in which they were taught in the curriculum. The content validity of a test is evaluated through construction of a *table of specifications*. First, an analysis is made of the knowledge and skills taught in the curriculum, a) the manner in which the material is presented to students, b) the manner in which students are required to respond to the material, and c) the proportion of emphasis of each skill taught in the curriculum. For example in arithmetic, addition problems may be presented as 2+4=___, in a vertical form, or as a word problem, e.g., A man had two mangos, he bought two coconuts, how much fruit did he have? Students may have to write or say the answer, or select from multiple choice answers. Addition may account for 1/4 of the curriculum and measurement may account for 1/8; thus, on the test, 1/4 of the test items should be on addition, 1/8 on measurement.

f. Does the test have *adequate reliability*? If there is no change in the ability of a group of students to solve arithmetic problems, then a) the students should get approximately the same scores if they take the same test twice on two separate occasions (*test-retest reliability*); also, b) the students should get approximately the same scores if they take two equivalent forms of the test on two separate occasions (*alternate form reliability*). It is desirable to know how reliable (consistent) a test is when used twice (test-retest reliability) if you want to give the test to a group of students before and after teaching them. If you think the students will remember how to answer some of the questions from the first to the second testing, use equivalent forms of the same test. If equivalent or alternate forms of the same test are used, it will be important to know the alternate form reliability of these tests. Usually the alternate form reliability and the test-retest reliability of acceptable tests range from .85 to .99. The higher the number, the better. Some people recommend that reliability should be

.90+. The size of the number reflects the amount of error in the test score. The lower the number, the more error there is in the score. Internal consistency measures of reliability are discussed in the previously recommended textbooks.

g. Will the test provide valid and reliable *diagnostic information*? Achievement tests cannot be used as diagnostic tests. The reasons for this restrictions were discussed in the previous chapter. Diagnostic tests are divided into subtests. Each subtest assesses different skills. Separate scores are given for each subtest. Subtests with low scores are considered to indicate areas of relative weaknesses, while subtests with high scores indicate areas of relative strength. To be used as diagnostic tests, each subtest should have a reliability of .85 or higher. The higher the reliability, the better. Note that the subtests of many "diagnostic tests" used with handicapped children in Western countries do not have reliability of .85 or more. These tests are not satisfactory for use as diagnostic tests.

h. Is the *language* suitable for the particular persons of the age, functional level and linguistic group to be tested? This topic was discussed in the previous chapter. A thorough examination should be made of the vocabulary, concepts and sentence structures used.

i. The problems associated with *modifying tests* for handicapped people was discussed in the previous chapter. As was stated, the greater the number and/or nature of the adaptations made to a test, the less standardized the administration becomes and the less acceptable is the use of the norms.

j. *Administrative considerations.* Is special training required by people who use the test? Some tests are designed to be administered only by speech therapists, psychologists or teachers with special training. Are the instructions clear to both the examiner and examinee? Are practice exercises and/or sample items provided so that the examinee clearly understands what she/he is to do? Is time taken to establish a relaxed friendly, nonthreatening, cooperative, motivating atmosphere before the examinee begins the test? Can the test be administered to individuals and/or groups of students? If the test is given to groups, is there adequate opportunity to supervise the students while they take the test?

k. Are there clear directions for *scoring and interpreting* the test? Are the scoring criteria objective, or do they require subjective interpretation? How difficult is it to convert the raw scores (the number of test items correct) to derived scores (grade equivalent scores, mental ages scores, percentiles)? Is the meaning of each

type of score adequately explained, for example, what is a grade equivalent or percentile score?

l. Is the test *motivating*? Is the content and style of the test interesting and appropriate to the age, sex, culture and functional level of the examinees?

m. Is the testing material of *sufficient quality*? Are blurred and faded mimeographed material used? Are the print and pictures clear, bold and readable?

Postscript

Skuy, Westaway, Perold and Makaula (1986) review issues related to the identification, evaluation and diagnosis of black disabled children. The authors designed the Pupil Screening Scale (questionnaire) for use in South Africa. The scale reviews information on sensory acuity, mobility, physical health, speech, academic performance, language comprehension, expressive language, orientation, anti-social behavior, emotional behavior and appropriate school behavior. An item analysis was conducted on each test item. The scale may not be directly useful in other contexts but the manner in which it was developed and the statistical methods used to test the validity of the scale serve as good examples.

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